CONTRIBUTIONS TO PHILIPPINE ORNITHOLOGY.

PART I.—A LIST OF THE BIRDS KNOWN TO INHABIT THE PHILIPPINE AND PALAWAN ISLANDS, SHOWING THEIR DISTRIBUTION WITHIN THE LIMITS OF THE TWO GROUPS.

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INTRODUCTION.

In 1888, while identifying the birds collected by ourselves in the Philippines during the preceding year, Doctor Bourns and myself began the preparation of a distribution table for the birds of the group. This table was ready for publication in 1890, but the opportunity of visiting the islands for a second time presented itself, and it seemed best to us to withhold the list until we could make it more complete.

Complications in the affairs of the Minnesota Academy of Science, resulting from the financial troubles of 1893, put a stop to work on our collections for more than a year after our return, and before the identification of our material was completed Mr. W. R. Ogilvie Grant's important series of papers had begun to appear in the *Ibis*. I have felt unwilling to let the list leave my hands until this series of papers should be concluded.

The unfortunate interruption in the field work on which Mr. Grant's papers were based, resulting from the rebellion of a part of the native population of the Philippines against Spanish rule, has necessarily brought the series to an end, and although it is to be hoped that Mr. Whitehead may return to the archipelago at some future time and conclude his work in the highlands of the larger islands, I have decided to publish the list in its present state as a basis for some conclusions at which I have arrived concerning the zoological relationships between the various islands of the Philippine group and the laws governing the distribution of their birds.

Although other duties have prevented Doctor Bourns from cooperating with me in the final work on the list, his past services both at home and in the field certainly entitle him to be considered one of its joint authors.

Thinking it desirable to show the exact bearing of the work done by the Menage expedition on that of our predecessors and successors, I have indicated it in the table by using stars, while the work of other collectors, including that of the Steere expedition, is shown by crosses.

Species peculiar to the Philippines are italicised. Genera and species which occur in the Palawan group, but have not been found in the Philippines, are left unnumbered.

An X followed by a question mark indicates that I consider the identity of the specimens obtained from the locality indicated to be doubtful. An * followed by a question mark indicates that birds of the genus, and probably of the species, designated were seen by us, but were not obtained, so that their occurrence in the localities in question is open to doubt. These doubtful species are omitted in the totals on the last page.

While it has been my desire to make the list as complete as possible, it has seemed to me best to be conservative in the admission of species, and none have been intentionally included for which a definite locality, and in nearly every instance a *definite collector* as well, could not be assigned.

It is needless to say that in the preparation of this list I have made use of the British Museum Catalogue of Birds. I have also made use of the material gathered by Doctor Steere in 1874, and that obtained by the Steere expedition in 1887–88. I am indebted to Doctor Steere for the loan, on several occasions, of material belonging to him personally.

I have made such use of the material gathered by Doctor Bourns and myself in 1890–1893 as has been practicable under the circumstances. During the summer months of 1894 we were able to identify most of our specimens, and upon our departure from Minneapolis fortunately took some material for further study. Material which it was impracticable to take with us we had expected to have sent to us for further study after our departure. In this, however, we were disappointed, and we were obliged to leave several important species unidentified.

In addition to the sources above referred to, I have derived information from numerous papers, a list of which follows.

DEAN C. WORCESTER.

ANN ARBOR, MICHIGAN, *July 31, 1897.*

Names of species.	Cagayan Sulu.	Cuyo.	Balabac.	Palawan.	Calamianes.	Bclol.	Siquijor.	Cebu.	Masbate.	Negros.	Guimaras.	Panay.	Tablas.	Romblon.	Sibuyan.	Mindoro.	Luzon.	Marinduque.	Catanduanes.	Finga.	Samar.	Leyte.	Dinagat.	Panaon.	Nipah.	Camiguin.	Bazol.	Saknijok.	Mindanao.	Basilan.	Malanipa.	Sulu.	Lapac.	Siassi.	Tawi Tawi.	Bongao.	Sibutu.
1. Megapodius cumingi Dillwyn			x	x*				x*					*	*	*		x	x		x	x*								x*	x*		*			*		x
2. Excalfactoria lineata (Scopoli)				x*				*	*	x*		*					x												x			x*					
3. Gallus gallus (Linnaeus)			x	x*	*		x	x*	*	*	x	x*	*	*	*	x*	x	x			x*								x	x*		x*					
Polyplectron napoleonis Lesson *a*				x*																																	
4. *Turnix fasciata* (Temminck)				x*	*			x*	*	x		*			*		x																			
5. *Turnix ocellata* (Scopoli)																	x																			
6. Treron nipalensis (Hodgson)				x*												x*																				
7. Osmotreron vernans (Linnaeus)				x*	*	x	x*	x	*	*	x*	x*					x													x*	x*		x		x		x	x
8. *Osmotreron axillaris* (G. R. Gray)							*	x		x	x	x*				x	x		x		x		x						x*	x*		x*				x	x
9. *Phabotreron amethystina* Bonaparte																	x				x*	x	x	x					x								
10. *Phabotreron leucotis* (Temminck)																x*	x		x																		
11. *Phabotreron nigrorum* Sharpe								x*	*	x*	x	x*	*		*																						
12. *Phabotreron occipitalis* Salvadori																														x*							
13. *Phabotreron brevirostris* Tweeddale						x	*														x*	x	x						x			x?					
14. *Phabotreron maculipectus* Bourns and Worcester										x*																											
15. *Phabotreron frontalis* Bourns and Worc								*																													
16. *Phabotreron cinnereiceps* Bourns and Worcester																																			*		
17. *Phabotreron brunneiceps* Bourns and Worcester																														*							
18. *Ptilopus occipitalis* (G. R. Gray)								x*		x							x				x*	x							x	x							
19. *Ptilopus marchei* Oustalet																	x																				
20. *Ptilopus leclancheri* (Bonaparte)			x	*				x		x	x		*				x		x		x															
21. *Ptilopus temminckii* (Des Murs and Prevost)																																					
22. *Ptilopus banguenensis* Meyer				x																									x	x*		x*			*	x	x
23. Carpophaga aenea (Linnaeus)			x	x*	*		*	x*	x*	x*	x*	*	*		*	x*	x	x	x		x*	x	x						x*	x*		x*			*	x	x
24. *Carpophaga nuchalis* Cabanis																x?	x			x									x?								
25. Carpophaga pickeringi Cassin	x																															x					x
26. *Carpophaga carola* Bonaparte										x						x	x												x								
27. *Carpophaga poliocephala* (G. R. Gray)								*	x	x		*				x	x				x*	x	x						x	x				*			
28. *Carpophaga mindorensis* Whitehead																x																					
29. Myristicivora bicolor (Scopoli)			x	x		x	x*			x	x					*		x			x				x			x	x		x	x*		*	x	
30. Columba griseigularis (Walden and Layard)										x	x						x												x	x*		x					x
31. *Macropygia tenuirostris* G. R. Gray			x	x*					*	x						x	x*	x				x							x*	x*		x		*	x	x
Turtur tigrinus (Temminck) *a*			x	x?																																	
32. Turtur dussumieri (Temminck)				x	*	x	x*	x	x	x	x	x*	*		*	x	x*	x	x		x	x							x*	*		x*		x	*		x

a Palawan group only.

DISTRIBUTION LIST—Continued.

Names of species.	Cagayan Sulu.	Cuyo.	Balabac.	Palawan.	Calamianes.	Bohol.	Siquijor.	Cebu.	Masbate.	Negros.	Guimaras.	Panay.	Tablas.	Romblon.	Siburyan.	Mindoro.	Luzon.	Marinduque.	Catanduanes.	Fuga.	Samar.	Leyte.	Dinagat.	Panaon.	Nipah.	Camiguin.	Bazol.	Sakuijok.	Mindanao.	Basilan.	Malanipa.	Sulu.	Lapac.	Siassi.	Tawi Tawi.	Bongao.	Sibutu.
33. Turtur humilis (Temminck)																x*	x*												x?								
34. Geopelia striata (Linnaeus)																	x				x																
35. Chalcophaps indica (Linnaeus)				x*	*		*	x	x	x*	x	x*	*	*	*	x*	x*	x			x*								x*	x*		x			*		
36. *Phlogoenas luzonica* (Scopoli)																	x																				
37. *Phlogoenas crinigera* (Reichenbach)																					*	x							x	x*		x?					
38. *Phlogoenas platenae* (Blasius)																x*																					
39. *Phlogoenas menagei* Bourns and Worc																																					
40. Caloenas nicobarica (Linnaeus)				x						*						x*	x															*			*		x
41. Hypotaenidia striata (Linnaeus)					*		*	x		x	x	x*			*		x				x	x							x*			x				
42. Hypotaenidia philippinensis (Linnaeus)																	x																				
43. *Hypotaenidia torquata* (Linnaeus)							*	x*	*	x	x	x*		*		*	x*	x	x		x*	x	x						x*						x	
Rallina fasciata (Raffles) *a*			x	x																																	
44 *Rallina euryzonoides* (Lafresnaye)								x		x		*					x*					x							*			x					
45. Porzana intermedia (Hermann)																	x																				
46. Porzana tabuensis (Gmelin)																	x																				
47. Poliolimnas cinereus Sharpe							x*	x*		*	x	*				*	x*	x				x	x						*x	*							
48. Limnobaenus fuscus (Linnaeus)																	x					x							x								
49. Limnobaenus paykulli (Ljungh.)																														x							
50. *Amaurornis olivacea* (Meyen)							*	x*				*					x*				x*	x							x								
51. Amaurornis phoenicura (Forster)				x	*		*					*				*		x											x*	*		x			*	x	
52. Gallinula chloropus (Linnaeus)								x			*	*				*	x*					x							x*								
53. Gallicrex cinerea (Gmelin)							*	*	x		*					x*	x	x	x										*			x					
54. *Porphyrio pulverulentus* Temminck																*	x																				
55. *Tachybaptes philippensis* (Bonn.)											x						x*																				
56. Puffinus leucomelas Temminck																	x																				
57. Hydrochelidon leucoptera (Meisner and Schinz)																													x*								
58. Hydrochelidon hybrida (Pallas)				x													x																				
59. Sterna bergii Lichtenstein			x	x*	*	x	*	*	*	*	*	*	*	*	*		*				*	x							x*			*					
60. Sterna anaestheta Scopoli												x																									
61. Sterna fuliginosa Gmelin							*																														
62. Sterna sinensis Gmelin				x												*													x							
Sterna melanauchen Temminck *a*				x																																	
63. Anous stolidus (Linnaeus)				x																																	
64. Larus ridibundus Linnaeus																	x				x								x								
65. Orthoramphus magnirostris (Vieillot)				x													x																				
66. Glareola orientalis Leach				x						x							x												x								
67. Hydrophasis chirurgus (Scopoli)																x*	x																				
68. Arenaria interpres (Linnaeus)	x			x		x	*		*	x							x												x								
69. Squatarola helvetica (Linnaeus)		x		x			x*			x*							x												x								

70. Charadrius dominicus P. L. S. Müller
71. Oethodromus geoffroyi (Wagler)
Oethodromus veredus (Gould) *a*
72. Oethodromus mongolus (Pallas)
73. Aegialitis dubia (Scopoli)
74. Aegialitis peroni (Bonaparte)
75. Aegialitis alexandrina (Linnaeus)
76. Himantopus leucocephalus Gould
77. Numenius arquatus Linnaeus
78. Numenius cyanopus Vieillot
79. Numenius variegatus (Scopoli)
80. Mesoscolopax minutus (Gould)
81. Limosa novae zealandiae Gray
82. Limosa limosa (Linnaeus)
83. Totanus calidris, Linnaeus
84. Heledromas ochropus (Temminck)
85. Heteractitis brevipes, Vieillot
86. Tringoides hypoleucus (Linnaeus)
87. Terekia cinerea (Güldenstadt)
88. Glottis nebularis (Gunnerus)
89. Rhyacophilus glareola (Gmelin)
90. Limonites ruficollis (Pallas)
91. Limonites damacensis Horsfield
92. Limonites temminckii Leisler
93. Heteropygia acuminata (Horsfield)
94. Ancylochilus subarquatus (Güldenstadt)
95. Tringa crassirostris Temminck and Schlegel
96. Limicola platyrhyncha (Temminck)
97. Gallinago stenura (Bonaparte)
98. Gallinago gallinago (Linnaeus)
99. Gallinago megala Swinhoe
100. Rostratula capensis (Linnaeus)
101. Ardea purpurea Linnaeus
102. Ardea cinerea Linnaeus
Ardea sumatrana Raffles *a*
103. Herodias garzetta (Linnaeus)
104. Herodias intermedia (Wagler)
105. Demiegretta sacra (Gmelin)
106. Bubulcus coromandus (Boddaert)
107. Butorides javanica (Horsfield)
Butorides amurensis Schrenck *a*
108. Phoyx manillensis (Meyen)
109. Ardetta flavicollis (Latham)
110. Ardetta cinnamomea (Gmelin)
111. Ardetta sinensis (Gmelin)
112. Ardetta eurhythma Swinhoe
113. Gorsachius melanolophus (Raffles)
114. Nycticorax manillensis Vigors
115. Nycticorax griseus (Linnaeus)

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Names of species.	Cagayan Sulu.	Cuyo.	Balabac.	Palawan.	Calamianes.	Bohol.	Siquijor.	Cebu.	Masbate.	Negros.	Guimaras.	Panay.	Tablas.	Romblon.	Sibuyan.	Mindoro.	Luzon.	Marinduque.	Catanduanes.	Fuga.	Samar.	Leyte.	Dinagat.	Panaon.	Nipah.	Camiguin.	Bazol.	Sakunjok.	Mindanao.	Basilan.	Malanipa.	Sulu.	Lapac.	Siassi.	Tawi Tawi.	Bongao.	Sibutu.
116. Melanopelargus episcopus (Boddaert)										x*		*				*	x					x							x								
117. Nettopus coromandelianus (Gmelin)																	x																				
118. Dendrocycna viduata (Linnaeus)																	x																				
119. Dendrocycna arcuata (Cuvier)							x	x	x	*		x	*				x		x		x	x								x*	x						
120. Dendrocycna guttata (Forster)																													x								
121. *Anas luzonica* Fraser							x		*		x	*					x	x	x		x																
122. Dafila acuta (Linnaeus)																	x																				
123. Fuligula fuligula (Linnaeus)																	x													x							
124. Dysporus piscator (Linnaeus)																													x								
125. Dysporus sula (Linnaeus)																	x						x						x								
126. Plotus melanogaster (Forster)										x						x*	x																				
127. Pelecanus rufescens Gmelin																	x																				
128. Fregata minor (Gmelin)				x						x							x												*								
129. Circus spilonotus Kaup				x												x	x												x			x					
130. Circus melanoleucus (Forster)										x*	x						x												x			x					
131. Circus aeruginosus (Linnaeus)																x	x																				
132. Astur trivirgatus (Temminck)			x	x																	x*	x							x*								
133. Astur soloensis (Latham)																	x												x*								
134. *Accipiter manillensis* Meyen										x	x*					x	x					x							x*								
135. Accipiter gularis (Temm. and Schlegel)				x																x																
136. Lophotriorchis kieneri (Geoffroy)												x					x	x											x								
137. Spizaetus limnaetus (Horsfield)				x	*											x													x								
138. *Spizaetus philippinensis* Gurney				x		*		x	x								x													x*							
139. *Spilornis holospilus* (Vigors)							x*									x	x	x	x		x*	x							x*	x*		*			*	x	
Spilornis davisoni Hume *a*			x	x*	*?																																
140. *Spilornis panayensis* Steere									*	x*	x	x	*	*	*																						
141. Butastur indicus (Gmelin)	x	x	x*	*	x	x*	x*	x*	x*	x*	x	x*				x	x				*								x	*		*			*		
142. Haliaetus leucogaster (Gmelin)			x*	*		*		*					*			*	x*				x*								x	*		*			*	x	
143. Haliastur intermedius Gurney				*	x	x	x*	*	x	x*	x*	x*	*	*	*	*	x*	x	x		x*	x								x	*	x	x*			*	x	
144. Pernis cristatus Cuvier				x			*								*						x								x			x*					
145. Elanus hypoleucus Gould					*		x		x	x						x*	x				x								x	x		x*			*	x	
146. *Baza magnirostris* Gray																	x												x								
147. *Baza lucopais* Sharpe				x										*							*																
148. *Pithecophaga jefferyi* Grant																	x?				x*	x?							x?								
149. *Microhierax erythrogenys* (Vigors)																*	x																				
Microhierax meridionalis Grant								x									x				x*								x								
150. Falco communis Gmelin				x						x						x	x												x								
151. Falco severus (Horsfield)				x						x*				*	*	*	x												x			x*			*		
152. Falco melanogenys Gould																	x																				
153. Falco ernesti Sharpe										x							x																				

154. Falco peregrinus Linnaeus
155. Cerchneis tinnunculus (Linnaeus)
156. Pandion haliaetus Linnaeus
157. Pandion leucocephalus Gould
158. Polioaetus ichthyaetus (Horsfield)
159. *Bubo philippensis* (Kaup)
160. *Bubo gurneyi* Tweeddale
161. *Scops megalotis* Gray
162. *Scops rufescens* (Horsfield)
163. *Scops everetti* Tweeddale
164. *Scops sibutensis* Sharpe
165. *Scops longicornis* Grant
166. *Scops whitcheadi* Grant
167. Ninox lugubris (Tickell)
168. Ninox japonica (Temminck and Schlegel)
Ninox scutulata (Raffles) *a*
169. *Ninox philippensis* Bonaparte
170. *Ninox spilocephala* Tweeddale
171. *Ninox reyi* Onstalet
172. *Ninox spilonotus* Bourns and Worcester
173. *Ninox mindorensis* Grant
Syrnium whitcheadi Sharpe *a*
174. Strix candida Tickell
175. *Batrachostomus septimus* Tweeddale
Batrachostomus javensis (Horsfield) *a*
176. *Batrachostomus menagei* Bourns and Worc.
Batrachostomus affinis Blyth *a*
177. *Batrachostomus microrhynchus* Grant
178. Eurystomus orientalis (Linnaeus)
179. *Pelargopsis gouldi* Sharpe
180. *Pelargopsis gigantea* Walden
181. Alcedo ispida Linnaeus
182. Alcedo meninting Horsfield
183. *Alcyone cyanipectus* (Lafresnaye)
184. *Alcyone nigrirostris* (Bourns & Worcester)
185. *Alcyone fluminicola* (Steere)
186. *Alcyone argentata* (Tweeddale)
187. Ceyx cnerythra Sharpe
188. *Ceyx melanura* Kaup
189. *Ceyx mindanensis* Steere
190. *Ceyx bournsi* Steere
191. *Ceyx samarensis* Steere
192. Halcyon coromandus (Latham)
193. *Halcyon gularis* (Kuhl)
194. *Halcyon winchelli* Sharpe
195. Halcyon pileatus (Boddaert)
196. Halcyon chloris (Boddaert)
197. *Halcyon hombroni* (Bonaparte)
198. *Halcyon lindsayi* (Vigors)
199. *Halcyon moseleyi* (Steere)

a Palawan group only.

DISTRIBUTION LIST—Continued.

Names of species.	Cagayan Sulu.	Cuyo.	Balabac.	Palawan.	Calamianes.	Bohol.	Siquijor.	Cebu.	Masbate.	Negros.	Guimaras.	Panay.	Tablas.	Romblon.	Sibuyan.	Mindoro.	Luzon.	Marinduque.	Catanduanes.	Fuga.	Samar.	Leyte.	Dinagat.	Panaon.	Nipah.	Camiguin.	Bazol.	Sakulijok.	Mindanao.	Basilan.	Malanipa.	Sulu.	Lapac.	Siassi.	Tawi Tawi.	Bongao.	Sibutu.
200. *Hydrocorax hydrocorax* (Linnaeus)																	x	x																		
201. *Hydrocorax semigaleatus* (Tweeddale)																					x*	x		x												
202. *Hydrocorax mindanensis* (Tweeddale)																													x*	x*						
203. *Anthracoceros montani* (Oustalet)																																*			*	
Gymnolaemus marchei (Oustalet) *a*			x	x*	*																															
204. *Penelopides panini* (Boddaert)									x*	x*	x	x*																								
205. *Penelopides manillae* (Boddaert)																	x	x																		
206. *Penelopides mindorensis* Steere																x*																				
207. *Penelopides affinis* Tweeddale																							x						x*							
208. *Penelopides basilanica* Steere																														x*						
209. *Penelopides samarensis* Steere																					x*	x														
210. *Cranorrhinus leucocephalus* (Vieillot)																										x			x*							
211. *Cranorrhinus waldeni* Sharpe									x	x	x*																									
212. *Merops bicolor* Boddaert					*			x*	*	x*	x	x*	*			x	x	x	x		x*	x							x*			*				
213. Merops philippinus Linnaeus						x	x*	x	*	x*	x	x*					x*				*	x							x	x*		*		*		
Caprimulgus macrurus Horsfield *a*				x*	*																															
214. *Caprimulgus manillensis* G. R. Gray				x												*?	x												x	x						
215. *Caprimulgus griseatus* G. R. Gray																*	x		x																	
Caprimulgus jotaka Temminck and Schlegel *a*				*																																
216. *Lyncornis macrotis* (Vigors)																*?	x																			
217. *Lyncornis mindanensis* Tweeddale																	x												x	*						
Chaetura giganteа (Temminck) *a*				x*																																
218. *Chaetura picina* Tweeddale																						x							x							
219. Chaetura celebensis Sclater									x																											
Collocalia fowi (Sharpe) *a*				x																																
220. Collocalia fuciphaga (Thunberg)				x				x*		x		x*				x*	x*												x							
221. Collocalia francica (Gmelin)					*					x		*																								
222. *Collocalia troglodytes* Gray				x*			*	*	*	x*	x*	x*		*	*	*	x*	x			x*	x								x						
223. *Collocalia marginata* Salvadori								x?	*								x?																			
224. *Collocalia linchi* Horsfield and Moore																	x												x						x	
225. *Collocalia whiteheadi* Grant				x													x																			
226. Macropteryx comata (Temminck)								x*	*	x*	x	x*	*			x	x*	x			x*								x*	x*		x*				x
227. *Harpactes ardens* (Temminck)																	x*	x			x*	x	x						x*	x*						
228. Coccystes coromandus (Linnaeus)				*			*																						x							
Surniculus lugubris (Horsfield) *a*			x	x																																
229. *Surniculus velutinus* Sharpe										x							x*				x*								x*	x		x			x*	
230. Hierococcyx sparverioides (Vigors)				x	*					x							x																			
231. Hierococcyx fugax (Horsfield)								*									x												x	*		*				
232. Cuculus canorus Linnaeus				x			*																													

233. Cuculus intermedius Vahl
234. Cuculus sommerati Latham
235. Cuculus micropterus Gould
236. Cacomantis merulinus (Scopoli)
237. Chalcococcyx xanthorhynchus (Horsfield)
238. Chalcococcyx malayanus Raffles
Eudynamis honorata (Linnaeus) *a*
239. *Eudynamis mindanensis* (Linnaeus)
240. *Centropus mindorensis* (Steere)
241. Centropus sinensis (Stephens)
242. *Centropus viridis* (Scopoli)
243. Centropus javanicus (Dumont)
244. *Centropus melanops* Lesson
245. *Centropus unirufus* (Cabanis and Heine)
246. *Centropus steeri* Bourns and Worcester
Dryococcyx harringtoni Sharpe *a*
247. *Dasylophus superciliosus* (Cuvier)
248. *Lepidogrammus cumingi* (Fraser)
249. *Cacatua haematuropygia* (P. L. S. Müller)
250. *Prioniturus discurus* (Vieillot)
Prioniturus cyaneiceps Sharpe *a*
251. *Prioniturus luconensis* Steere
252. *Prioniturus mindorensis* Steere
253. *Prioniturus verticalis* Sharpe
254. *Prioniturus montanus* Grant
255. *Tanygnathus luconensis* (Linnaeus)
256. *Tanygnathus burbidgei* Sharpe
257. *Tanygnathus everetti* Tweeddale
258. *Bolbopsittacus lunulatus* (Scopoli)
259. *Bolbopsittacus mindanensis* (Steere)
260. *Bolbopsittacus intermedius* Salvadori
261. *Loriculus philippensis* (P. L. S. Müller)
262. *Loriculus apicalis* Souancé
263. *Loriculus bonapartei* Souancé
264. *Loriculus chrysonotus* Sclater
265. *Loriculus regulus* Souancé
266. *Loriculus mindorensis* Steere
267. *Loriculus siquijorensis* Steere
268. *Loriculus worcesteri* Steere
269. Xantholaema haematocephala (P. L. S. Müller)
270. *Xantholaema intermedia* Shelley
271. *Iyngipicus maculatus* (Scopoli)
272. *Iyngipicus validirostris* Blyth
273. *Iyngipicus ramsayi* Hargitt
274. *Iyngipicus fulvifasciatus* Hargitt
275. *Iyngipicus leytensis* (Steere)
276. *Iyngipicus menagei* Bourns and Worcester
Tiga everetti Tweeddale *a*
Chrysocolaptes erythrocephalus Sharpe *a*

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Names of species.	Cagayan Sulu.	Cuyo.	Balabac.	Palawan.	Calamianes.	Bohol.	Siquijor	Cebu.	Masbate.	Negros.	Guimaras.	Panay.	Tablas.	Romblon.	Sibuyan.	Mindoro.	Luzon.	Marinduque.	Catanduanes.	Fuga.	Samar.	Leyte.	Dinagat.	Panaon.	Nipah.	Camiguin	Bazol.	Sakuijok	Mindanao.	Basilan.	Malanipa.	Sulu.	Lapac.	Siassi.	Tawi Tawi.	Bongao.	Sibutu.
277. *Chrysocolaptes haematribon* (Wagler)																	x	x																			
278. *Chrysocolaptes lucidus* (Scopoli)																													x*	x*							
279. *Chrysocolaptes xanthocephalus* Waldeu and Layard									x*	x*	x	x*																									
280. *Chrysocolaptes rufopunctatus* Hargitt																					x*	x		x													
281. *Microstictus fuliginosus* Tweeddale																					x	x							x*								
282. *Microstictus funebris* (Valenc.)																	x	x	x																		
Hemilophus pulverulentus (Temminck) *a*			x	x*																																	
283. Thriponax javensis (Horsfield)								*	x	x*	x	x					x												x*	x*		x*	x		x*	x	
284. *Thriponax pectoralis* Tweeddale																					x*	x		x													
Thriponax hargitti Sharpe				x*																																	
285. *Thriponax mindorensis* Steere																x*																					
286. *Sarcophanops steerii* Sharpe																							x						x*	x*							
287. *Sarcophanops samarensis* Steere																					x	x															
288. *Corone philippina* Bonaparte		x		x		x	x*	x*		x*	x*	x*	*			x*	x	x	x		x*		x	x		x			x*	x*		x*				x
289. Corvus pusillus Tweeddale			x	x*	*											x*																					
290. *Corvus samarensis* Steere																					x*																
291. Sturnia violacea (Boddaert)				x*						x						*	x												x					*		
292. Acridotheres cristatellus (Gmelin)																	x*																				
293. *Sarcops calvus* (Linnaeus)							x*	x*	x	x*	x	x*	*			x*	x	x	x		x*	x	x						x	x*		x			*	x	x
Mainatus palawanensis Sharpe *a*			x	x*	*																																
294. *Calornis panayensis* (Scopoli)	x		x	x*	*	x	x*	x*		x*	x	x	x*			x*	x	x	x		x*	x			x	x			x	x*		x*		x	*	x	x
295. *Dicrurus balicassius* (Linnaeus)																x*	x*	x																			
296. *Dicrurus mirabilis* Walden and Layard								x	x*	x*	x	x*																									
297. *Dicrurus striatus* Tweeddale																					x*	x		x	x				x*	x*							
Chibia palawanensis Tweeddale *a*			x	x*	*																																
298. Chibia borneensis Sharpe	x																															x*			*	x	x
299. *Chibia m nagei* Bourns and Worcester																																					
Buchanga palwanensis Whitehead *a*			x	x*	*																																
300. *Oriolus albiloris* Grant																	x																				
301. *Oriolus chinensis* Linnaeus			x	x*	*	x	x*	x*	*	x*	x*	x*	*	*		x*	x*	x	x	x	x	x	x	x					x*	x*		x*	x	*	x	x
302. *Oriolus steerii* Sharpe																													x*	x*							
303. *Oriolus assimilis* Tweeddale								x																											*	x	
304. *Oriolus cinerogenys* Bourns and Worc																																			*	x	
305. *Oriolus nigrostriatus* Bourns and Worc									x*	x																											
Oriolus xanthonotus Horsfield *a*				x	?																																
306. *Oriolus samarensis* Steere																					x*	x															
307. *Oriolus isabellae* Grant																	x																				
308. Munia oryzivora Linnaeus			x								x	*					x*				*								x								
309. Munia jagori Martens			x	x*	*	x	*	x*	*	x*	x	x*	*	*	*	x	x*		x		x*	x								x*	*		x*		*	x	

310. *Munia cabanisi* Sharpe												*					x*																				
311. Munia formosana Swinhoe																	x																				
312. *Uroloncha everetti* (Tweeddale)			x	x*	*			x*		x	x	x	*	*	*		x		x		x	x							x*	x*					x*		
313. Passer montanus Linnaeus								*									x*																				
314. *Loxia luzoniensis* Grant																	x																				
315. *Pyrrhula leucogenys* Grant																	x																				
316. Emberiza spodocephala (Pallas)																			x																		
317. Emberiza pusilla Pallas																	x																				
318. Emberiza sulfurata Temminck and Schlegel																	x																				
319. *Chlorura brunneiventris* Grant																	x																				
320. Alauda gulgula Franklin						x											x																				
321. *Mirafra philippinensis* Wardlaw Ramsay																	x																				
322. Motacilla ocularis Swinhoe			x	x*													x																				
323. Motacilla melanope Pallas			x	x*				x	*	x*	x	x*	*	*	*	x*	x*	x	x		x*	x							x	x*		*			*		
324. Motacilla flava Linnaeus			x	x*		x				*						x	x*		x													x*					
Limonidromus indicus (Gmelin) *a*			x																																		
325. Anthus maculatus Hodgson				x													x																				
326. Anthus rufulus Vieillot				x	*	x	x*	x*	*	x*	x*	x*	*	*	*	x*	x*				x	x		x					x*								
327. Anthus cervinus Naumann				x													x												x								
328. Anthus gustavi Swinhoe				x*					*	x	x			*	*		x*					x								x*		x			*		
Anthus richardi Vieillot *a*			x																																		
329. *Rhabdornis mystacalis* (Temminck)									*	x*		x*					x*																				
330. *Rhabdornis minor* Grant																					x*	x	x						x	x							
331. *Rhabdornis inornatus* Grant																					x																
Dendrophila frontalis (Swainson) *a*			x	x*																																	
332. *Dendrophila oenochlamys* Sharpe								x*		x	x	x*									x*	x							*	x*							
333. *Dendrophila mesoleuca* Grant																	x																				
Chalcostetha insignis (Jardine) *a*			x	x*																																	
334. *Aethopyga magnifica* Sharpe								x*		x*		*	*		*																						
Aethopyga shelleyi Sharpe *a*			x	x*	*																																
335. *Aethopyga bella* Tweeddale																					x								x								
336. *Aethopyga arolasi* Bourns and Worcester																																*			*		
337. *Aethopyga bonita* Bourns and Worcester								*	*			*																									
338. *Aethopyga flavipectus* Grant																x*	x																				
339. *Eudrepanis pulcherrima* (Sharpe)																					x*	x	x							x*							
340. *Eudrepanis jefferyi* Grant																	x																				
341. *Cinnyris sperata* (Linnaeus)				x*	*		*	*	x*	x*	x	*	*	*	*	x	x	x			x*	x	x		x				x								
342. *Cinnyris juliae* (Tweeddale)																													x	x*		x			x*		
343. *Cinnyris jugularis* (Linnaeus)						x	*	x*	*	x*	x*	x*	*	*	*	x*	x*	x	x		x*	x	x			x			x*	x*		x*			*	x	x
Cinnyris aurora (Tweeddale) *a*			x	*x	*																																
344. *Cinnyris flagrans* (Oustalet)																	x																				
345. *Cinnyris guimarasensis* Steere										x	x	*																									
346. *Cinnyris whiteheadi* Grant																	x																				
347. *Cinnyris excellens* Grant																	x		x																		
348. *Arachnothera flammifera* Tweeddale																					x*	x							x	x*							
Arachnothera dilutior Sharpe *a*				x*																																	
349. *Arachnothera philippinensis* (Steere)																					x	x							x								
350. Anthothreptes malaccensis (Scopoli)	x		x	x*																															x	x	x
Anthothreptes rhodolaema Shelley *a*				x																																	

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DISTRIBUTION LIST—Continued.

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351. *Anthothreptes chlorigaster* Sharpe								X*	X*	X*		*					X												X*	X*		X*			*		
352. *Anthothreptes griseigularis* Tweeddale																					X*								X								
353. *Dicaeum retrocinctum* Gould																X*	X																				
354. *Dicaeum haematostictum* Sharpe										X*	X*	X*																									
355. *Dicaeum rubriventer* Lesson								X*	*								X	X			*	X	X							X*	X*						
356. *Dicaeum dorsale* Sharpe									X*	X*		X*																									
357. *Dicaeum pallidior* Bourns and Worcester								X																													
358. *Dicaeum sibuyanicum* Bourns and Worc.															*																						
359. *Dicaeum intermedium* Bourns and Worc.													*	*																		*					
360. *Dicaeum assimile* Bourns and Worcester																																			*		
361. *Dicaeum xanthopygium* Tweeddale																X*	X	X																			
362. *Dicaeum cinereigulare* Tweeddale																					X*	X								X*							
363. *Dicaeum besti* Steere							X*																													X	
364. *Dicaeum sibutuense* Sharpe																																					
365. *Dicaeum hypoleucum* Sharpe																														X*		X		X		X	
366. *Dicaeum mindanense* Tweeddale																													X	*		*					
367. *Dicaeum pygmaeum* (Kittlitz)			x	x*			*		*	x	x				*	x	x				*	x														
368. *Dicaeum everetti* Tweeddale																					x	x	x	x													
369. *Dicaeum luzoniense* Grant																	x				x																
370. *Dicaeum obscurum* Grant																	x																				
371. *Prionochilus olivaceus* Tweeddale																					x	x	x						x	x*							
Prionochilus johannae Sharpe *a*			x	x*	*																																
372. *Prionochilus inexpectatus* Hartert										x						x	x				x	x															
373. *Prionochilus bicolor* Bourns and Worcester																																*					
374. *Prionochilus quadricolor* Tweeddale								x*																													
375. *Piprisoma aeruginosum* (Bourns and Worc.)								*								x	x												*							
376. *Zosterops everetti* Tweeddale								x*																													
377. *Zosterops meyeni* Bonaparte																	x*																				
378. *Zosterops nigrorum* Tweeddale									*	x*		x*																									
379. *Zosterops siquijorensis* Bourns and Worc.							*			x																											
380. *Zosterops luzonica* Grant																	x																				
381. *Zosterops aureiloris* Grant																x	x																				
382. *Zosterops basilanica* Steere																					x*	x	x						x*	x*		x		x*	x	
Parus amabilis Sharpe *a*			x	x*																																	
383. *Parus elegans* Lesson								x*		x*	x	x*				x*	x*														x*			*	x	
384. *Parus nehrkornae* (Blasius)																													x							
385. Parus semilarvatus (Salvadori)										x							x																			
386. *Hyloterpe philippinensis* Walden							*										x				x*	x	x						x	x*						
387. *Hyloterpe homeyeri* Blasius																																x*			*	x	x
Hyloterpe whiteheadi Sharpe				x*																																	

388. *Hyloterpe winchetti* Bourns and Worcester
389. *Hyloterpe albiventris* Grant
390. Lanius lucionensis Linnaeus
391. Lanius nasutus Scopoli
392. Lanius tigrinus Drapiez
393. *Lanius validirostris* Grant
394. Artamus leucogaster (Wagler)
395. Phylloscopus borealis (Blasius)
396. Phylloscopus lugubris (Blyth.)
Phylloscopus xanthrodryas Swinhoe *a*
397. Pratincola caprata (Linnaeus)
398. Acrocephalus orientalis (Temminck and Schlegel
399. Locustella fasciolata (Gray)
400. Locustella ochotensis (Middendorf)
401. Locustella lanceolata (Temminck)
402. *Lusciniola seebohmi* Grant
403. *Cettia seebohmi* Grant
404. Cettia canturiens (Swinhoe)
405. *Brachypteryx poliogyna* Grant
Brachypteryx brunneiceps Grant
406. *Chimarrhornis bicolor* Grant
407. *Megalurus ruficeps* Tweeddale
408. *Megalurus palustris* Horsfield
409. *Orthotomus frontalis* Sharpe
410. *Orthotomus cinereiceps* Sharpe
411. *Orthotomus nigriceps* Tweeddale
412. *Orthotomus castaneiceps* Walden
413. *Orthotomus derbianus* Moore
Orthotomus cineraceus Blyth *a*
414. Orthotomus ruficeps (Lesson)
415. *Orthotomus samarensis* Steere
416. *Orthotomus chloronotus* Grant
417. Phyllergates cinereicollis Sharpe
418. Cisticola cisticola (Temminck)
419. Cisticola exilis (Vigors and Horsfield)
420. Geocichla varia (Pallas)
421. Geocichla interpres (Temminck)
422. *Geocichla cinerea* Bourns and Worcester
423. *Turdus mindorensis* Grant
424. *Turdus nigrorum* Grant
425. Turdus obscurus Gmelin
426. Turdus chrysolaus (Temminck)
427. *Turdus thomassoni* Seebohm
428. Monticola solitaria (P. L. S. Müller)
429. Calliope kamtschatkensis (Gmelin)
430. *Copsychus mindanensis* (Gmelin)
Cittocincla nigra Sharpe *a*
431. *Cittocincla luzoniensis* (Kittlitz)
432. *Cittocincla cebuensis* Steere

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433. *Cittocincla superciliaris* Bourns and Worc.																																					
434. *Cittocincla nigrorum* Grant										x																											
Turdinus ruffrons (Tweeddale) *a*			x	x*																																	
435. *Dasycrotapha speciosa* Tweeddale										x*		*!																									
Mixornis woodi Sharpe *a*			x	x*																																	
Mixornis cagayanensis Guillemard *a*	x																																				
436. *Zosterornis striatus* Grant																	x																				
437. *Zosterornis whiteheadi* Grant																	x																				
438. *Zosterornis dennistouni* Grant																	x																				
439. *Zosterornis pygmaeus* Grant																					x	x															
440. *Zosterornis plateni* (Blasius)																													x								
441. *Zosterornis capitalis* (Tweeddale)																						x	x	x					x	x*							
442. *Zosterornis nigrocapitatus* (Steere)																					x*	x															
443. *Maeronus striaticeps* Sharpe																														x							
444. *Maeronus mindanensis* Steere																					x*	x	x						x*								
445. *Macronus kettlewelli* Guillemard																																x*			x*	*	
Ptilocichla falcata Sharpe *a*			x	x*																																	
446. *Ptilocichla basilanica* Steere																														x*							
447. *Ptilocichla mindanensis* Steere																													x*								
448. *Ptilocichla minuta* Bourns and Worcester																					x*																
Amropsis cinereiceps Tweeddale *a*			x	x*																																	
449. *Dendrobiastes basilanica* Sharpe																														x*							
450. *Pseudotharrhaleus caudatus* Grant																	x																				
Aegithina viridis (Bonaparte) *a*				x*																																	
Chloropsis palawanensis Sharpe *a*			x	x*	*																																
451. *Chloropsis flavipennis* (Tweeddale)								x*																					x								
452. *Hypsipetes fugensis* Grant																				x																	
453. *Iole everetti* (Tweeddale)																					x*	x	x	x					x								
454. *Iole haynaldi* (Blasius)																																x*			x*	x	x
455. *Iole rufigularis* Sharpe																													x	x							
456. *Iole philippinensis* (Gmelin)						x		x*	*!	x*	x	x*					x*	x			x	x		x					x								
457. *Iole mindorensis* Steere																x*																					
458. *Iole siquijorensis* Steere							x*																														
459. *Iole cinereiceps* Bourns and Worcester												*	*																								
460. *Iole monticola* Bourns and Worcester																																					
Iole striaticeps Sharpe *a*				x																																	
461. *Poliolophus urostictus* (Salvadori)										x!							x		x		*	x	x	x					x	x*							
Microps melanocephalus (Gmelin) *a*				x																																	
Criniger frater Sharpe *a*			x	x*	*																																
Criniger palawanensis Tweeddale *a*				x*																																	

462. *Pycnonotus goiavier* (Scopoli)
Pycnonotus cinereifrons (Tweeddale) *a*
463. *Irena cyanogastra* Vigors
464. *Irena melanochlamys* Sharpe
Irena tweeddalii Sharpe *a*
465. *Irena ellae* Steere
Artamides sumatrensis (P. L. S. Müller) *a*
466. *Artamides striatus* (Boddaert)
467. *Artamides guillemardi* Salvadori
468. *Artamides kochii* (Kutter)
469. *Artamides panayensis* Steere
470. *Artamides mindorensis* Steere
471. *Artamides cebuensis* Grant
472. *Edoliisoma caeruleseens* (Blyth)
473. *Edoliisoma mindanensis* (Tweeddale)
474. *Edoliisoma panayensis* Steere
475. *Edoliisoma everetti* Sharpe
476. *Edoliisoma alterum* (Wardlaw-Ramsey)
Pericrocotus igneus Blyth *a*
477. Pericrocotus cinereus Lafresnaye
478. *Pericrocotus marchesae* Guillemard
479. *Pericrocotus leytensis* Steere
480. *Pericrocotus novus* Wardlaw Ramsey
481. *Lalage melanoleuca* (Blyth)
482. *Lalage minor* (Steere)
483. Lalage terat (Boddaert)
Hemichelidon sibirica (Gmelin) *a*
Hemichelidon ferruginea Hodgson *a*
484. *Gerygone simplex* Cabanis
485. Alseonax latirostris Raffles
486. Muscicapa griseisticta (Swinhoe)
487. *Muscicapula mindanensis* Blasius
488. *Muscicapula samarensis* Bourns and Worcester
489. *Muscicapula luzoniensis* Grant
490. Muscicapula westermanni Sharpe
491. Xanthopygia narcissina (Temminck)
Xanthopygia cyanomelaena (Temminck) *a*
492. Hypothymis azurea (Boddaert)
493. *Hypothymis superciliaris* Sharpe
494. *Hypothymis samarensis* Steere
495. *Cyanomyias coelestis* (Tweeddale)
496. *Cyanomyias helenae* Steere
497. *Rhipidura nigritorquis* Vigors
498. *Rhipidura cyaniceps* (Cassin)
499 *Rhipidura albiventris* Sharpe
500. *Rhipidura sauli* Bourns and Worcester
501. Terpsiphone affinis (A. Hay)
502. *Zeocephus rufus* (G. R. Gray)
503. *Zeocephus cinnamomeus* Sharpe

a Palawan group only.

DISTRIBUTION LIST—Continued.

Names of species.	Cagayan Sulu.	Cuyo.	Balabac.	Palawan.	Calamianes.	Bohol.	Siquijor.	Cebu.	Masbate.	Negros.	Guimaras.	Panay.	Tablas.	Romblon.	Sibuyan.	Mindoro.	Luzon.	Marinduque.	Catanduanes.	Fuga.	Samar.	Leyte.	Dinagat.	Panaon.	Nipah.	Camiguin.	Bazol.	Sakuijok.	Mindanao.	Basilan.	Malanipa.	Sulu.	Lapac.	Siassi.	Tawi Tawi.	Bongao.	Sibutu.
Zeocephus cyanescens Sharpe *a*	...	...	...	x*	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	x*	x	...	...	...	...	...	...	...	...	...	...	...	...	...	...
504. *Rhinomyias rufi cauda* Sharpe	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	x	...	...	...	...	...	...	...	...	...	...	...	x*	x*	...	...	...	x	...	...
505. *Rhinomyias insignis* Grant	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
506. *Rhinomyias albigularis* Bourns and Worcester	...	...	...	...	...	...	...	...	...	x*	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
507. *Rhinomyias ocularis* Bourns and Worcester	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	*	...	...	...	...	...
508. Culicicapa hilianthea (Wallace)	...	...	...	x*	...	...	...	*	...	x*	...	x	...	...	...	...	x	...	...	...	...	x	...	...	...	...	...	...	...	...	...	...	...	*	x	...
Culicicapa ceylonensis (Swainson) *a*	...	...	...	x	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Cryptolopha xanthopygia Whitehead *a*	...	...	...	x	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
509. *Cryptolopha nigrorum* Moseley	...	...	...	...	...	...	...	...	...	x	...	...	...	...	...	x	x	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
510. *Cryptolopha flavigularis* Bourns and Worcester	...	...	...	...	...	...	...	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
511. *Cryptolopha olivacea* (Moseley)	...	...	...	...	...	...	...	...	...	x*	...	...	...	...	...	...	x	...	...	...	x	x	...	...	...	...	...	...	*	...	...	*	...	...	*	...	...
512. *Stoparola panayensis* (Sharpe)	...	...	...	...	...	...	...	...	...	x	...	x	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
513. *Stoparola nigrimentalis* Grant	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	x	x	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Siphia banyumas (Horsfield) *a*	...	...	...	x	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
514. *Siphia philippinensis* (Sharpe)	...	...	...	...	...	...	*	x*	*	x	*	x	*	*	*	x*	x*	x	...	...	x*	x	x	...	...	...	...	...	x	x*	...	x*	...	...	*	x	x
Siphia lemprieri Sharpe *a*	...	...	x	x*	*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
515. *Siphia engaenensis* Grant	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	x	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Siphia erithacus Sharpe *a*	...	...	...	x*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
516. *Siphia herioti* Wardlaw-Ramsey	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	x	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
517. *Callaeops periopthalmica* Grant	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	x ?	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
518. Cotile sinensis (Gray)	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	x	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
519. Hirundo gutturalis Scopoli	...	...	...	*	...	...	*	...	...	x*	x*	...	...	...	*	x*	...	...	...	...	x	...	...	...	...	...	...	...	x*	*	...	*	...	...	...	...	...
520. Hirundo javanica Sparrman	x	...	...	x*	*	x	*	x	*	x*	*	*	...	...	x	x*	x	x	x	...	x	x	x	...	...	...	...	...	x*	x*	...	x*	...	...	...	...	x
521. Hirundo striolata (Boie)	...	...	...	...	...	...	...	...	x*	...	...	...	...	...	...	...	x	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
522. *Pitta erythrogastra* Temminck	...	...	...	x*	*	...	*	...	*	x	*	*	*	*	x*	x	x	...	...	...	x	...	...	...	...	...	...	...	x*	x*	...	x	...	*	x	x
523. *Pitta kochi* Brüggemann	...	...	...	...	...	•	...	...	...	...	...	...	...	...	...	...	x	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
524. *Pitta atricapilla* Lesson	...	...	x	x*	*	...	x*	*	...	x	...	...	*	...	...	*	x*	x	...	...	x	...	...	...	...	...	...	...	x*	x*	...	x	...	*	x	...
525. Pitta muelleri (Bonaparte)	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	x
526. *Pitta steerii* (Sharpe)	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	x	...	...	...	...	...	...	...	x	...	...	...	...	...	...	...
Pitta propinqua (Sharpe)	...	...	x	x	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Total known species	15	5	69	181	80	54	87	125	98	171	96	118	71	47	65	134	286	74	48	4	150	119	39	20	10	7	1	2	207	119	8	108	6	6	97	61	36

a Palawan group only.

INDEX TO GENERA INCLUDED IN THE DISTRIBUTION LIST.

CONTRIBUTIONS TO PHILIPPINE ORNITHOLOGY.

PART II.—NOTES ON THE DISTRIBUTION OF PHILIPPINE BIRDS.

By Dean C. Worcester,
Assistant Professor of Zoology, University of Michigan.

STATEMENT OF STEERE'S CONCLUSIONS AND REVIEW OF RECENT ORNITHOLOGICAL WORK IN THE PHILIPPINES.

Although the ornithology of the Philippines has long attracted the attention of naturalists, so far as I am aware the first attempt to discuss at any length the interesting zoogeographical problems presented by the distribution of birds within the limits of the group was that of Doctor J. B. Steere, who in 1888 published in *Nature* a brief paper in which he proposed to assign the name "zoological province" to the Philippines as a whole, and to divide them into six "subprovinces," as follows: "First, the northern Philippines, consisting of Luzon and Marinduque and a number of small islands about Luzon; second, Mindoro; third, the central Philippines, made up of the islands of Panay, Negros, Guimaras, Cebu, Bohol, and Masbate; fourth, the eastern Philippines, comprising the islands of Samar and Leyte; fifth, the southern Philippines, embracing the great island of Mindanao, with Basilan and perhaps Sulu, and, sixth, the western Philippines, consisting of the islands of Paragua, or Palawan, and Balabac."

In a second paper, which appeared simultaneously in the *Auk* and the *Ibis* for July, 1894, the same author makes a more detailed examination of the distribution of the genera and species of nonmigratory land birds, basing his conclusions entirely on the collections made by the Steere expedition.

Of these collections he says that, while not comprising all species known from the islands, they are so nearly complete that any just conclusions drawn from their study must be accepted as truth, which further exploration will only strengthen, and from the facts at his disposal he attempts to deduce several somewhat radical and far-reaching laws of evolution and distribution.

Since the appearance of these papers our knowledge of the distribution of Philippine birds has been materially increased. Mr. A. H. Everett has collected on Tawi Tawi, Sibutu, and Balabac. Mr. John Whitehead has done marvelous things in the highlands of Luzon, and has collected

in Catanduanes and Fuga. Doctor Bourns and I have collected in Tawi Tawi, the Caliamianes Islands (Culion and Busuanga), Masbate, Tablas, Romblon, and Sibuyan, and, apart from the extension of our knowledge to these previously nearly or quite unknown areas, much has been learned as to the distribution of species over many of the better-known islands of the group.

It seems to me, therefore, that the time has come for a reexamination of the problems in question. Even were the data at my disposal no more complete than those of which Steere chose to avail himself, I should still be disposed to dissent from some of his conclusions.

WHAT ARE THE PHILIPPINES?

Steere makes the Philippines *political* and the Philippines *zoological* identical areas. With this view of the case I am unable to agree. Everett has long since[1] discussed Steere's "subprovince," the *Western Philippines*, and has shown by evidence that seems to me incontrovertible that Balabac and Palawan belong not to the Philippine, but to the *Bornean* group of islands.

Since the appearance of Everett's paper Bourns and I have collected for some weeks on the islands of Culion and Busuanga, the birds and mammals of which were practically unknown before our visit; for although the French naturalist M. Alfred Marche spent some time here during his long sojourn in the archipelago, his collections seem to have been scattered without being systematically worked up, and his results lost to the world. Save for a few scattering references in his "Luçon et Palouan," I have been able to find no record whatever of his discoveries in the Calamianes Islands.

Although our own work there must not be considered in any sense exhaustive, it was still sufficient to leave no room for doubt as to the zoological affinities of this hitherto practically unknown group. I shall attempt to show, first, that the Calamianes Islands belong zoologically with Palawan; second, that they form with Palawan and Balabac an extension of the Bornean group of islands, and therefore can not be included with the Philippines proper.

CULION AND BUSUANGA.

Culion and Busuanga are by far the most important islands of the Calamianes group. They lie so near each other and are so connected by small islets that they form a practically continuous area, and such differences as exist between their birds are purely the result of their somewhat different physical characteristics.

Culion has little forest. It is moderately hilly, but has no mountains of any considerable height. Its hills are for the most part covered with impenetrable bamboo thickets. In the center of the island is a marshy plain of large extent. Busuanga, on the other hand, has a good deal

[1] Proc. Zool. Soc., April 16, 1889, pp. 220 228.

of fairly good forest remaining, and one would naturally expect to meet with deep-woods birds here which would be found with great difficulty, if at all, in Culion.

During our stay we obtained representatives of 80 species of birds. Reference to the accompanying distribution table will show that they were, with a few unimportant exceptions, all well-known Palawan forms.

The exceptions are:

1. *Hypotaenidia striata.*
2. *Haliastur intermedius.*
3. *Elanus hypoleucus.*
4. *Polioaetus ichthyaetus.*
5. *Strix candida.*
6. *Merops bicolor.*
7. *Colloca'ia francica.*
8. *Cisticola exilis.*
9. *Lanius nasutus.*

Merops bicolor is the only strictly Philippine species in the list, and with this possible exception every one of the nine will eventually be recorded from Palawan, while the occurrence of such characteristic Palawan forms as the following leaves no room for doubt as to the relationship of the Calamianes birds:

1. *Gymnolaemus marchei.*
2. *Dryococcyx harringtoni.*
3. *Prioniturus cyaniceps.*
4. *Tiga everetti.*
5. *Chrysocolaptes erythrocephalus.*
6. *Mainatus palawanensis.*
7. *Chibia palawanensis.*
8. *Buchanga palawanensis.*
9. *Aethopyga shelleyi.*
10. *Cinnyris aurora.*
11. *Prionochilus johannae.*
12. *Orthotomus ruficeps.*
13. *Cittocincla nigra.*
14. *Chloropsis palawanensis.*
15. *Criniger frater.*
16. *Irena tweeddalii.*
17. *Artamides sumatrensis.*
18. *Zeocephus cyanescens.*
19. *Siphia lemprieri.*

The present disparity in the number of species known from Palawan and the Calamianes will doubtless disappear to a large degree as the birds of the latter islands become better known. It is not to be expected, however, that their bird fauna will ever be found to equal in richness that of Palawan, with its lofty mountains and magnificent forests.

BALABAC.

Until within a short time the birds of Balabac were known to us only through the very incomplete collections made by Steere in 1874, and by the Steere Expedition in 1887, the small prospect of important discoveries, together with the extreme unhealthfulness of the island, having kept collectors away from it. More recently, however, Mr. A. H. Everett, to whom Philippine ornithology owes so much, has made a collecting trip to the island, the result being to establish the fact of a very close relationship between the birds of Balabac and Palawan.

Sixty-nine species are at present known from the island. Of these all but *Anthus richardi*, *Limonidromus indicus*, *Pandion leucocephalus*, *Demiegretta sacra*, and *Turtur tigrinus* have been recorded from Palawan. I saw a specimen of *Turtur tigrinus* at the office of the "inspección de montes" in Manila which was said to have been obtained in Palawan, and the remaining four species will doubtless eventually be

found there. The only noteworthy difference as yet brought out between the avifaunae of the two islands is the apparent absence of *Polyplectron napoleonis* in Balabac.

CUJO.

Cujo is known to us only through the few birds collected there by Doctor A. B. Meyer, and the five species listed throw no light on the zoological position of the island. But little forest remains on it and it seems to be very poor in birds.

THE ZOOLOGICAL POSITION OF THE PALAWAN GROUP.

In the Palawan group of islands, then, I include Balabac, Palawan, Culion, Busuanga, and the small islands immediately adjacent to them.

I have attempted to show that these islands should be classed together. It would remain to show that taken as a whole their affinities were decidedly with Borneo rather than with the Philippines proper had this not already been done in the paper by Mr. Everett previously referred to.

Although our knowledge of Palawan birds has been somewhat increased since this paper appeared, such additional facts as have been ascertained have simply strengthened Everett's conclusions, and little remains to add to what he has already said. I trust, therefore, that I shall be excused if I give a brief resumé of his argument, with such small additions and subtractions of my own as seem to me to be called for.

Mr. Everett arranges the birds of the Palawan group in three tables, as follows:

Table I shows the Palawan species which are common to Borneo or other parts of western Indo-Malaya and to the Philippines, together with the species which are of wide general distribution or are migrants from continental Asia. In other words, it includes the birds which afford no evidence of value.

Table II shows the Palawan species which are identical with or allied to species inhabiting the Philippines, Sanghir, Celebes, etc., but which are not found in Borneo or western Indo-Malaya except as migrants or stragglers.

Table III shows the Palawan species which are identical with or allied to species inhabiting Borneo or western Indo-Malaya, but which are not found in the Philippines except as migrants or stragglers.

The following species of Everett's Table III must be transferred to his Table I, for the reasons indicated below:

Corvus pusillus, because it is abundant in Mindoro. *Alcedo meninting*, abundant in Tawi Tawi. *Ceyx euerythra*, abundant in Tawi Tawi and occurs in Mindoro. *Halcyon pileata*, recorded from Tawi Tawi and Basilan. *Cuculus sonnerati*, shot by myself in Romblon. *Chalcococcyx xanthorhynchus*, recorded from Mindoro and Cebu. *Centropus javensis*,

common throughout the Philippines. *Spizaetus limnaetus*, recorded from Mindoro, Luzon, Marinduque, and Panay. *Baza leucopais*, recorded from Samar and Romblon. *Treron nipalensis*, common in Mindoro.

Adding these ten species, together with thirty others which have been added to the avifauna of the Palawan group since Mr. Everett's paper was published, Table I will stand as follows:

1. *Megapodius cumingi.*
2. *Excalfactoria lineata.*
3. *Gallus gallus.*
4. *Treron nipalensis.*
5. *Osmotreron vernans.*
6. *Ptilopus hangueyensis.*
7. *Carpophaga aenea.*
8. *Myristicivora bicolor.*
9. *Chalcophaps indica.*
10. *Caloenas nicobarica.*
11. *Hypotaenidia striata.*
12. *Rallina fasciata.*
13. *Amaurornis phoenicura.*
14. *Hydrochelidon hybrida.*
15. *Sterna bergii*
16. *Sterna sinensis.*
17. *Sterna melanauchen.*
18. *Anous stolidus.*
19. *Charadrius fulvus.*
20. *Squatarola helvetica.*
21. *Aegialitis geoffroyi.*
22. *Aegialitis dubia.*
23. *Aegialitis peroni.*
24. *Aegialitis cantiana.*
25. *Aegialitis vereda.*
26. *Aegialitis mongolica.*
27. *Esacus magnirostris.*
28. *Strepsilas interpres.*
29. *Gallinago megala.*
30. *Tringa subminuta.*
31. *Tringa ruficollis.*
32. *Tringoides hypoleucus.*
33. *Totanus calidris.*
34. *Totanus glareola.*
35. *Totanus brevipes.*
36. *Terekia cinerea.*
37. *Limicola platyrhyncha.*
38. *Numenius lineatus.*
39. *Numenius variegatus.*
40. *Numenius phaeopus.*
41. *Glareola orientalis.*
42. *Ardea purpurea.*
43. *Ardea sumatrana.*
44. *Herodias intermedia.*
45. *Demiegretta sacra.*
46. *Bubulcus coromandus.*
47. *Butorides javanica.*
48. *Butorides amurensis.*
49. *Ardetta cinnamomea.*
50. *Gorsachius melanolophus.*
51. *Fregata minor.*
52. *Circus spilonotus.*
53. *Astur trivirgatus.*
54. *Accipiter gularis.*
55. *Spizaetus limnaetus.*
56. *Butastur indicus.*
57. *Haliaetus leucogaster.*
58. *Haliastur intermedius.*
59. *Pernis ptilonorhynchus.*
60. *Elanus hypoleucus.*
61. *Falco communis.*
62. *Falco severus.*
63. *Pandion haliaetus.*
64. *Pandion leucocephalus.*
65. *Polioaetus ichthyaetus.*
66. *Strix candida.*
67. *Eurystomus orientalis.*
68. *Halcyon coromandus.*
69. *Alcedo ispida.*
70. *Alcedo meninting.*
71. *Ceyx erythra.*
72. *Halcyon coromandus.*
73. *Halcyon chloris.*
74. *Halcyon pileatus.*
75. *Chaetura gigantea.*
76. *Collocalia lowi.*
77. *Collocalia fuciphaga.*
78. *Collocalia francica.*
79. *Coccystes coromandus.*
80. *Hierococcyx sparverioides.*
81. *Cuculus canorus.*
82. *Cuculus intermedius.*
83. *Cuculus sonnerati.*
84. *Cacomantis merulinus.*
85. *Chalcococcyx xanthorhynchus.*
86. *Centropus sinensis.*
87. *Centropus javanicus.*
88. *Corvus pusillus.*
89. *Sturnia violacea.*
90. *Munia oryzivora.*
91. *Motacilla ocularis.*
92. *Motacilla melanope.*
93. *Motacilla flava.*
94. *Limonidromus indicus.*

95. *Anthus maculatus.*
96. *Anthus rufulus.*
97. *Anthus cervinus.*
98. *Anthus gustavi.*
99. *Anthus richardi.*
100. *Lanius nasutus.*
101. *Artamus leucogaster.*
102. *Phylloscopus borealis.*
103. *Phylloscopus xanthodryas.*
104. *Acrocephalus orientalis.*
105. *Cisticola cisticola.*
106. *Cisticola exilis.*
107. *Monticola solitaria.*
108. *Pericrocotus cinereus.*
109. *Lalage terat.*
110. *Hemichelidon sibirica.*
111. *Hemichelidon ferruginea.*
112. *Hypothymis azurea.*
113. *Culicicapa ceylonensis.*
114. *Hirundo gutturalis.*
115. *Hirundo javanica.*

Here, then, are 115 species which afford us no evidence as to the relationship between the groups of islands in question. Moreover, I am inclined to remove several species from Mr. Everett's Table III, and make for them a separate table. It does not seem to me that the evidence furnished by such species as *Cittocincla nigra*, *Ptilocichla falcata*, and *Iole striaticeps* is by any means unequivocal. *Cittocincla nigra* has a close ally in *C. cebuensis*. *Orthotomus* has representatives in the majority of the islands of the Philippine group. *Iole* has numerous Philippine species. *Chloropsis palawanensis* has an ally in *C. flavipennis* of Cebu and Mindanao. *Irena* has species in Basilan, Mindanao, Leyte, Samar, and Luzon.

I shall of course admit that in several instances the closest allies of the species in question are Bornean, and *Orthotomus ruficeps* is a Bornean species, but so long as there is not more difference between them and their nearest Philippine allies than exists between the Philippine species *inter se*, I fail to see that any very satisfactory conclusions can be drawn from them. I propose, therefore, to assign them to Table IV, which includes those Palawan species with allies not only in Borneo or western Indo-Malaya, but in the Philippines as well, and which hence furnish us with evidence of doubtful value.

1. *Arachnothera dilutior.*
2. *Hyloterpe whiteheadi.*
3. *Orthotomus ruficeps.*
4. *Cittocincla nigra.*
5. *Ptilocichla falcata.*
6. *Chloropsis palawanensis*
7. *Iole striaticeps.*
8. *Irena tweeddalii.*
9. *Chibia palawanensis.*

Table II (Everett's Table II with additions) shows the Palawan species, which are identical with, or allied to, species inhabiting the Philippines, Sanghir, Celebes, etc., but which are not found in Borneo or western Indo-Malaya, except as migrants or stragglers. Species peculiar to the Palawan group are distinguished by the prefix of an *.

1. *Turnix fasciata.*
2. *Ptilopus leclancheri.*
3. *Macropygia tenuirostris.*
4. *Turtur dussumieri.*
5. *Spizaetus philippinensis.*
6. *Baza leucopais.*
7. *Scops everetti.*
8. *Pelargopsis gouldi.*
9. *Merops bicolor.*
10. *Caprimulgus manillensis.*
11. *Collocalia troglodytes.*
12. *Collocalia whiteheadi.*
13. *Eudynamis mindanensis.*
14. *Cacatua haematuropygia.*
15. *Tanygnathus luconensis.*
*16. *Prioniturus cyanicceps.*
*17. *Chrysocolaptes erythrocephalus.*
*18. *Thriporax hargitti.*

19. *Calornis panayensis.*
20. *Oriolus chinensis.*
21. *Munia jagori.*
22. *Urolonchа everetti.*
*23. *Aethopyga shelleyi.*
24. *Cinnyris sperata.*
*25. *Cinnyris aurora.*
26. *Dicaeum pygmaeum.*
*27. *Parus amabilis.*
28. *Lanius lucionensis.*
29. *Rhipidura nigritorquis.*
*30. *Zeocephus cyanescens.*
31. *Calicicapa helianthea.*
*32. *Siphia lemprieri.*
33. *Pitta erythrogastra.*
*34. *Pitta propinqua.*
35. *Pitta atricapilla.*

There remain only the birds of Table III, which shows the Palawan species identical with, or allied to, species inhabiting Borneo or western Indo-Malaya, but not found in the Philippines, except as migrants or stragglers. Species peculiar to the Palawan group are distinguished by the prefix of an *.

1. *Polyplectron napoleonis.*
2. *Turtur tigrinus.*
3. *Spilornis davisoni.*
4. *Ninox scutulata.*
*5. *Syrnium whiteheadi.*
6. *Batrachostomus javensis.*
7. *Batrachostomus affinis.*
*8. *Gymnolaemus marchei.*
9. *Caprimulgus macrurus.*
10. *Caprimulgus jotaka.*
11. *Surniculus lugubris.*
12. *Eudynamis honorata.*
*13. *Dryococcyx harringtoni.*
*14. *Tiga everetti.*
*15. *Hemilophus pulverulentus*
*16. *Mainatus palawanensis.*
*17. *Buchanga palawanensis.*
18. *Oriolus xanthonotus.*
19. *Dendrophila frontalis.*
20. *Chalcostetha insignis.*
21. *Anthothreptes malaccensis.*
*22. *Prionochilus johannae.*
23. *Turdinus rufifrons.*
*24. *Mixornis woodi.*
*25. *Anuropsis cinereiceps.*
*26. *Aegithina viridis.*
27. *Micropus melanocephalus.*
*28. *Criniger frater.*
*29. *Criniger palawanensis.*
*30. *Pycnonotus cinereifrons.*
31. *Artamides sumatrensis.*
32. *Pericrocotus igneus*
*33. *Cryptolopha xanthopygia.*
*34. *Siphia banyumas.*
*35. *Siphia erithacus.*

We have then a total of 194 species of birds known from the group. Of these 124 do not yield any satisfactory evidence. Of the remaining seventy 35 are related to Bornean and 35 to Philippine species. This at first sight might not seem very conclusive, but if we examine the species of Table III we shall note that of the 35 genera included 15 are without known representatives in the Philippines. We shall note further that the two genera peculiar to the group, *Gymnolaemus* and *Dryococcyx*, are allied to genera belonging to the typical Indo-Malayan subarea. Last of all we shall note that the percentage of peculiar species is much higher among the Bornean than among the Philippine species, there being 18 of the former against 7 of the latter.

Everett's final conclusion is as follows: "Not only has a larger proportion of the existing bird population entered the group from the Bornean side than has invaded it from the Philippines, but the western element represents the fundamental ornis, since it exhibits a markedly higher degree of differentiation, which is certainly indicative of its greater antiquity and longer isolation."

This conclusion seems to me to be wholly justified by the facts,

especially when one remembers the negative as well as the positive evidence, and notes the entire absence in the Palawan group of such characteristic Philippine genera as *Penelopides*, *Loriculus*, *Iyngipicus*, *Sarcops*, *Dicrurus*, *Megalurus*, *Copsychus*, and *Rhinomyias*.

It is interesting to note that the evidence furnished by the mammals proves even more conclusively than that afforded by the birds the close relationship of the islands of the Palawan group both with each other and with Borneo. Excluding bats, 5 of the 18 genera remaining have no Philippine representatives, while of the 22 species but 5 occur in the Philippines. Of these 5 only *Paradoxurus philippinensis* can be regarded as a distinctively Philippine species, and according to Mr. Everett even this occurs in Borneo.

CAGAYAN SULU.

Cagayan Sulu is known to us only through the paper of Doctor Guillemard on the birds collected there during the voyage of the yacht *Marchesa*. Guillemard obtained 15 species of birds, the only novelty being *Mixornis cagayanensis*. The evidence, so far as it goes, indicates that the island is to be considered Bornean.

Too little is at present known of its avifauna, however, to make it safe to pass a final judgment. Bourns and I had planned to work it thoroughly. Unfortunately for us a boat load of Cagayan Sulu natives were captured by a Spanish gunboat while engaged in piratical operations on the coast of Tawi Tawi. They were brought to Sulu, where we were at the time, and were compelled to work in chains on the streets for some weeks. They were finally allowed to return to their homes, where they promptly stirred up so much ill feeling as to render the island, which had hitherto been peaceful enough, altogether too dangerous for a collecting ground. We therefore passed it by.

It is barely connected with Borneo by the hundred-fathom line, and I have little doubt that such evidence as may be obtained in future will confirm that already at our disposal.

THE PHILIPPINES PROPER.

Turning now to the Philippines proper, by which term I mean to designate the remaining islands included in our distribution list, I propose to first discuss Steere's remaining subdivisions and to then consider some of the more general problems involved.

Steere's five remaining "subprovinces" are, in my judgment, very far from being zoologically equivalent. In some instances the differences depended on in establishing their boundaries are simply the occurrence of different representative species of the same genera in the areas in question. In other cases whole genera present in one area are lacking in another, while in Cebu, which Steere has not considered worthy of separate rank, we miss entire families which are represented in the islands with which he has united it.

Where such contradictory results are arrived at the principle on which they are based must be unsound or its application faulty.

I propose to take up the various known islands singly where their bird faunae show marked differences, in groups where the faunae of several islands are practically identical, and to discuss the relationships involved, without however attempting to divide the islands into a number of zoologically equivalent groups. I shall preface my remarks in each case with a few brief notes on the physical characteristics of the various islands, so far as they are known to me personally.

For determining the relationships of the islands *inter se* I shall depend chiefly on the distribution of those species which are peculiar to the Philippines, or to the Philippine and Palawan groups, not forgetting to note the absence of genera or families where such absence occurs.

My evidence is necessarily of two kinds—*positive*, based on the known occurrence of the forms in question, and *negative*, based on the apparent absence of the same. Manifestly the positive evidence is of a more satisfactory character than the negative, for it may be urged that failure to discover a given form in a given place is by no means a proof of its nonexistence there. This may or may not be true. Failure to discover *Halcyon winchelli* in an island would not serve to convince me that it was lacking. The single specimen obtained by Bourns in Samar in 1888 has never been duplicated. On the other hand, I would undertake to determine, and that in a very short time, whether a given island contained an *Orthotomus*, a *Penelopides*, or a *Chrysocolaptes*.

My negative evidence, then, is based on the apparent nonoccurrence of species and genera which, after our long experience in the Philippines, I consider it improbable that we should have overlooked.

Species peculiar or nearly peculiar to the group I shall for convenience designate *Philippine species*. In the distribution list they will be found italicised.

The total number of species recorded from the islands is 526. Of these 323 are apparently confined quite strictly to the group.

THE CENTRAL PHILIPPINES.

This "subprovince," as defined by Steere, embraces the islands Panay, Negros, Guimaras, Cebu, Bohol, and Masbate. It can, I think, be readily shown that while Panay, Guimaras, Negros, and Masbate are so closely related as to be properly classed together, Cebu ought not to be included with them. While the evidence in the case of Bohol is far less complete than in that of Cebu, what there is of it seems to me to indicate rather a relationship with Leyte and Mindanao than with the central islands.

Panay is some 90 miles in greatest length by 60 in greatest width. In most parts of the island the last traces of forest have disappeared.

Good collecting ground may still be found in the mountains in the northwestern portion of the island.

Negros lies southeast of Panay, from which it is separated by a shallow channel, apparently nowhere more than 20 fathoms in depth, and but 4 miles wide at its narrowest point. The greatest length of Negros is 145 miles, its greatest width about 45. It offers excellent collecting ground, as its central chain of mountains, which runs practically the whole length of the island, is abundantly clothed with forest, and may be reached in a hundred places. The highest peak of the chain, Malaspina or Canloön, attains a height of 8,192 feet.

Numerous collectors have worked in the lowlands of Negros, and three members of the Steere expedition made a short trip into the highlands, but Whitehead is the only collector who has ever carried on systematic work in the island at any considerable elevation.

Guimaras is to all intents and purposes a part of Panay, from which it is separated by a narrow and shallow passage. Its forest is being rapidly cleared away. We found collecting much better in 1888 than in 1890.

Masbate is an island of irregular outline, its greatest length being some 70 miles. In its interior lie extensive grassy plains. Fairly large tracts of forest may still be found within a short distance of Palanoc, the capital and chief port of the island. Masbate lies some 25 miles northeast of Panay, the deepest water indicated in the intervening channel being 31 fathoms. So far as I am aware, the only work done on the birds of Masbate has been that of the Menage and Steere expeditions.

Panay was the scene of Sonnerat's work, and has since been visited by numerous collectors; but owing to the scarcity of forest and the difficulty of reaching it the birds of this island are much less well known than are those of Negros. We were exceedingly anxious to find good collecting ground in Panay, and after wasting much time in fruitless search finally reached fairly well wooded country at Calantas, near Batan, in the northern part of the island. The locality proved to be very unhealthy, however, and we were forced to establish our headquarters 10 miles from the forest, so that our work was carried on under difficulties.

We saw high and apparently well wooded mountains farther to the west.

One hundred and eighteen species of birds are recorded from Panay, 96 from Guimaras, 98 from Masbate, and 171 from Negros. Eliminating the wide-ranging species, which are useless for our purpose, and confining ourselves to the Philippine forms, we find Panay has 55, Guimaras 48, Masbate 50, and Negros 80.

We must take Negros as our standard, since it is best known, and upon referring to the distribution list we shall find that almost without exception those species which have been found in Panay, Guimaras, and Masbate, have been found in Negros also.

Individuality is given to the avifauna of these four islands by the occurrence of the following species, the known distribution of which is indicated in the table:

Species characteristic of the Central Philippines.

Names of species.	Negros.	Panay.	Guimaras.	Masbate.	Tablas.	Romblon.	Sibuyan.	Cebu.	Bohol.
1. Phabotreron maculipectus	x	....	....	....	....	....	....	....	....
2. Phabotreron nigrorum	x	x	x	x	x	....	x	x	....
3. Spilornis panayensis	x	x	x	x	x	x	x	....	....
4. Batrachostomus menagei	....	x	....	....	....	....	....	....	....
5. Alcyone nigrirostris	x	x	....	....	....	....	....	x	....
6. Halcyon moseleyi	x	....	....	....	....	....	....	....	....
7. Penelopides panini	x	x	x	x	....	....	....	....	....
8. Cranorrhinus waldeni	x	x	x	....	....	....	....	....	....
9. Loriculus regulus	x	x	x	x	x	x	x	....	....
10. Xantholaema intermedia	x	x	....	x?	....	....	....	x	....
11. Iyngipicus maculatus	x	x	x	....	....	....	....	x	....
12. Chrysocolaptes xanthocephalus	x	x	x	x	....	....	....	....	....
13. Dicrurus mirabilis	x	x	x	x	....	....	....	x	....
14. Oriolus nigrostriatus	x	....	....	x	....	....	....	....	....
15. Aethopyga bonita	x	....	....	x	....	....	....	x	....
16. Aethopiga magnifica	x	x	....	....	x	....	x	x	....
17. Cinnyris guimarasensis	x	x	x	....	....	....	....	....	....
18. Dicaeum haematostictum	x	x	x	....	....	....	....	....	....
19. Dicaeum dorsale	x	x	....	x	....	....	....	....	....
20. Zosterops nigrorum	x	x	....	x	....	....	....	....	....
21. Hyloterpe winchelli	x	x	....	x	x	....	x	x	....
22. Brachypteryx brunneiceps	x	....	....	....	....	....	....	....	....
23. Orthotomus castaneiceps	x	x	x	x	....	....	....	....	....
24. Turdus nigrorum	x	....	....	....	....	....	....	....	....
25. Cittocincla superciliaris	....	....	....	x	....	....	....	....	....
26 Cittocincla nigrorum	x	....	....	....	....	....	....	....	....
27. Dasycrotopha speciosa	x	x?	....	....	....	....	....	....	....
28. Artamides panayensis	x	x	x	x	....	....	....	....	....
29. Edoliisoma panayensis	x	x	x	....	....	....	....	....	....
30. Rhipidura albiventris	x	x	x	x	....	....	....	....	....
31. Rhinomyias albigularis	x	....	x	....	....	....	....	....	....
32. Stoparola panayensis	x	x	....	....	....	....	....	....	....
Total	30	22	15	15	5	2	5	8	0

It will be noted that all but ten of these thirty-two species are, so far as we at present know, strictly confined to Negros, Panay, Guimaras, and Masbate. Not one of them has been found in Bohol, and only eight of them are known to occur in Cebu.

The apparent differences between Negros, Panay, and Guimaras which this table brings out admit of ready explanation. It will be noted at once that they are nearly all negative—i. e., they consist in the nondiscovery in some of the islands of species which have been found in others. In but a single case have we an instance of the occurrence of different representative species of one of the genera of this table in any two of these islands.

If we compare Negros with Panay, for instance, we note that *Phabotreron maculipectus*, *Halcyon moseleyi*, *Oriolus nigrostriatus*, *Aethopyga bonita*, *Brachypteryx brunneiceps*, *Turdus nigrorum*, and *Cittocincla nigrorum* are recorded from Negros, but not from Panay.

Phabotreron maculipectus, *Aethopyga bonita*, and *Rhinomyias albigularis* are all deep-woods forms, rare and shy. Each of these species

was discovered by Bourns and myself in Negros after our work in Panay was concluded. *Halcyon mosleyi* and *Oriolus nigrostriatus* are rare birds, while the remaining three species are known only from Whitehead's specimens, and at least two of them are highland forms.

Taking into consideration that the highlands of Panay have never been visited by a collector, and remembering that there are 171 species of birds known from Negros, against but 118 from Panay, it is small wonder that these 7 comparatively rare species should be recorded from Negros, but not from Panay. I venture to prophesy that almost every one of these apparent differences will disappear as Panay becomes better known.

It is interesting to note in this connection that only one of the Panay species of this list is not recorded from Negros, and this species is a "frogmouth," known only from the single specimen obtained by Bourns and myself. Its discovery in Panay was the merest chance, and we never saw a second specimen.

The same course of reasoning which has been employed in discussing the differences between Negros and Panay may be applied to the apparent differences between Guimaras on the one hand and Negros and Panay on the other.

In the case of Masbate, however, we have some differences of a positive character. *Alcyone nigrirostris* and *Dicaeum haematostictum* are here replaced by *Alcyone cyanipectus* and *Dicaeum rubriventer*. As Masbate is but 20 miles from the coast of Luzon, and this gap is partially bridged by the intervening island of Ticao, it is not to be wondered at that some Luzon forms should have straggled in.

Seemingly the most important difference between Masbate and Negros is the occurrence in the two islands of different species of *Cittocincla*. On the whole, however, the relationship between Masbate and the islands with which I have joined it is vastly stronger than between it and Luzon.

From these facts it seems to me evident that Negros, Panay, Guimaras, and Masbate should be grouped together, and probable that they have in the past been actually connected.

They are separated from the eastern and southern islands on account of the following differences: First, the occurrence of twenty-two peculiar species of birds, and ten others which range only to the Tablas-Romblon-Sibuyan group, or to Cebu; second, the absence of such genera as *Phlogoenas*, *Hydrocorax*, *Harpactes*, *Surniculus*, *Bolbopsittacus*, *Microstictus*, *Zosterornis*, *Macronus*, *Ptilocichla*, *Poliolophus*, *Irena*, *Pericrocotus*, *Arachnothera*, and *Muscicapula*.

Glancing for a moment at the mammals, we note that these islands have a spotted deer peculiar to them, and a little tiger cat (*Felis bengalensis*) which has not been recorded from any other island of the Philippines proper, while they lack the genera *Sciurus*, *Sciuropterus*, *Galeopithecus*, and *Tarsius*, as well as other characteristic mammals of

the northern and eastern islands. In short, the evidence furnished by the mammals is strongly confirmatory of the conclusions already reached from our examination of the birds.

CEBU.

Cebu extends in a northeast-southwest direction for 120 miles, its greatest width being slightly more than 20 miles. At its southern extremity it approaches to within about 4 miles of Negros. As already indicated, Steere has included it in his "subprovince," the central Philippines, and a glance at the map certainly would not lead one to expect a fundamental difference between the avifaunae of Cebu and Negros. Nevertheless, I shall attempt to show that such a difference exists.

The first really important ornithological work ever done in Cebu was that of Mr. A. H. Everett, who made some interesting finds there during his famous collecting tour of the islands.

The Steere expedition visited the island in 1888, and Bourns and I made vigorous efforts to find forest in the high hills back of the town of Carmen. We met with most indifferent success, finding only now and then a small patch of trees at the summit of some steep incline. The ground was often so treacherous that we were obliged to hunt on all fours, and many of the birds shot were lost, falling far below us, where we could not reach them. Two new species, *Cittocincla cebuensis* and *Ninox spilonotus*, were obtained, and *Chloropsis flavipennis* was seen, but none of Mr. Everett's other new species were met with.

In 1891, while skirting the west coast in a small sugar steamer, we were so fortunate as to discover what we had been assured did not exist in the island, namely, a fair-sized patch of forest on tolerably smooth ground. We were unable to stop at the time, but returned the following year and collected for several weeks with good success, not only rediscovering all of Everett's new species, but adding a fine new *Phabotreron*, an *Iole*, and a *Piprisoma* to the list ourselves. We also added 37 known species to the Cebu list, bringing the total up to 125.

The following species are seemingly peculiar to the island of Cebu: *Phabotreron frontalis*, *Loriculus chrysonotus*, *Oriolus assimilis*, *Dicæum pallidior*, *Cryptolopha flavigularis*, *Cittocincla cebuensis*, *Iole monticola*, *Edoliisoma cebuensis*, and *Artamides cebuensis*.

Apart from the presence of these peculiar species, other important differences separate Cebu from the central Philippines. The latter islands have another long-billed *Phabotreron* (*P. maculipectus*), another *Oriolus* (*O. nigrostriatus*), another *Dicæum* (*D. dorsale*), another *Edoliisoma* (*E. panayensis*), and another *Artamides* (*A. panayensis*). We do not find any close ally of the large *Iole monticola* in the central islands, nor is there any species known which at all resembles the beautiful *Prionochilus quadricolor* of Cebu. These peculiar species furnish us with important evidence, but it is by no means the only evidence at our disposal. *Chloropsis flavipennis* affords us another example of a

genus conspicuous in the central islands by its absence, while Cebu lacks the genera *Chrysocolaptes* and *Orthotomus*, and is without a single known representative of the *Bucerotidae* and *Timeliidae*.

What have we to set over against this by way of proof of relationship with the central Philippines? Simply the occurrence of eight species of birds characteristic, on the whole, of the central group, but in three instances at least (*Aethopyga magnifica*, *Hyloterpe winchelli*, and *Phabotreron nigrorum*) ranging beyond it to the north as well as to Cebu.

It seems to me evident from the large number of important forms in the central Philippines which do not occur in Cebu, and from those in Cebu which are wanting in the central Philippines, that the avifaunae of the two islands were originally very distinct. The wonder is not that eight species should have made their way, in one direction or the other, over 4 miles of sea, but rather that thirty-four species should have failed to cross, or, having crossed, should have failed to establish themselves.

In this connection it is interesting to note the absence of deer in Cebu. *Felis bengalensis* probably occurs, as the natives described it to us. We saw a cap made of its fur, and also saw what was apparently the result of a cross between it and a domestic cat.

The channel which separates Cebu from Negros, although narrow, is everywhere very deep, the chart showing 110 to 120 fathoms—"no bottom." I myself found 200 fathoms of water not far from the Negros coast. I believe that this deep channel is indicative of a long-standing separation between the two islands. It would, it seems to me, be more reasonable to unite the chain of islands which extends from Luzon to Basilan into a single group than to include Cebu with Panay, Guimaras, Masbate, and Negros.

BOHOL.

The relationship of the birds of Bohol is difficult to determine, as the last trace of virgin forest seems to have long since been swept from the island, and with its disappearance a considerable part of the record of Bohol's past, as furnished by its birds, has been forever blotted out.

Of the 54 species of birds known to inhabit the island but 13 are Philippine species, and most of these are wide-ranging forms which afford us no evidence of value.

The three exceptions to this rule, *Loriculus apicalis*, *Orthotomus frontalis*, and *Phabotreron brevirostris*, all point unequivocally to a relationship between the birds of Bohol and those of the eastern and southern islands rather than with Cebu or the central Philippines. This view of the position of Bohol is made the more probable by the occurrence of *Galeopithecus*, a mammal which ranges through the southern and eastern islands from Basilan to Luzon, but is unknown in the central group.

Although the distance from Bohol to Leyte is slightly greater than that to Cebu, the water between Bohol and Leyte is very shallow, the deepest sounding being but 22 fathoms, while soundings varying from 91 to 105 fathoms have been made in the channel between Bohol and Cebu without getting bottom.

If a bit of forest remains on this island it would richly repay a visit. From the evidence at hand I can only conclude that the island should be grouped with Leyte rather than with Cebu.

SIQUIJOR.

Siquijor is a small island, with an area of about 90 square miles. It lies some 12 miles southeast of the southern extremity of Negros. There is a tradition among the natives to the effect that the island has been thrown up from beneath the sea within a comparatively short time, and there is abundant geological evidence that this tradition is founded on fact. Every stone cracked open by the hammer shows evident signs of its coral origin. The tops of the highest hills, which rise a thousand feet above sea level, are strewn with the shells of the very same mollusks which to-day live along the shores. The hills themselves are mere masses of coral rag, to which a few trees cling with difficulty, as the soil washes down into the valleys almost as fast as it is formed. The fresh-water streams are without fish.

The birds of Siquijor form a somewhat miscellaneous assemblage. Ten or 12 miles of water may seem a small matter to us here in America, where our change of seasons drives many of our birds from north to south and back again, but in the Tropics, where birds may be born, grow old, and die within the limits of a single grove, and never suffer want of food or shelter, the effect of a barrier of these dimensions is far more noteworthy. In the present instance numerous species of birds have either utterly failed to cross from the neighboring islands, or having reached the island have been unable to live and multiply there.

So far as I know the only work ever done on the birds of Siquijor has been that of Mateo Francisco, Bourns, and myself. By diligent search, carried on for weeks on two different occasions, we were able to raise the total number of species of birds recorded to 86. But 34 of these are Philippine species, and, as was perhaps to be anticipated, nearly all of the 34 are species which range widely throughout the archipelago.

Not a single one of the species characteristic of the central islands was found in Siquijor. *Phabotreron brevirostris*, *Ceyx bourusi*, *Halcyon winchelli*, and *Hyloterpe philippinensis* have probably come in from Mindanao, though they might possibly have worked through from Leyte by way of Bohol.

To me, however, the most interesting feature of the avifauna of this little island is *the occurrence of three well-marked representative* species of birds. These are *Dicaeum besti*, *Loriculus siquijorensis*, and *Iole siquijorensis*.

The occurrence of these three peculiar species on an island which has recently been heaved up from beneath the sea would present an interesting problem to nonbelievers in evolution. How did these species get into Siquijor? There are but two possible theories: They are the modified descendants of species that have straggled into the island, or a special creative act has recently been necessary, in order to populate Siquijor with birds.

It is interesting to note that no *Megapodiidae*, *Turnicidae*, *Bucerotidae*, *Capitonidae*, *Picidae*, *Dicruridae*, *Sittidae*, *Paridae*, or *Timeliidae* are known from the island, although each of these families is represented in the islands immediately adjacent.

TABLAS, ROMBLON, AND SIBUYAN.

So far as I am aware, the only collections of birds ever obtained from these islands are those made there by m self in 1892. I had hoped for much from Sibuyan, knowing that it was surrounded by water of considerable depth, but I fully expected to find old friends in the birds of Tablas. The results of my work show very conclusively the folly of attempting to draw *a priori* conclusions as to the avifaunae of adjacent islands from their geographical relationship as shown on a chart which does not give accurately the depth of the water between them. Tablas is a well-wooded island some 30 miles in length, by 8 to 10 in width. A range of high hills runs from north to south near the east coast.

During my stay in the island I was in such poor health as not once to be able to set foot in the forest. I was fortunate in having with me as a hunter, however, Mateo Francisco, a Philippine native, who was brought to this country as a boy by Steere in 1874, returned to the Philippines with us in 1887 and shot the greater part of the birds brought back by Steere in 1888. He remained at his old home in Mindanao when we left the islands, and we picked him up there in 1891. His familiarity with the birds and their ways was so great that I could easily direct his work, sending him for anything I desired, and I felt great confidence in his statements as to the occurrence or nonoccurrence of the commoner forms.

Fully expecting to find the birds of Tablas identical with those of Panay, I was pleasantly surprised when Mateo brought in on the first day an *Iole* larger than any previously discovered in the Philippines, and a fine new *Chibia*. During my stay in the island he brought me specimens of 71 species of birds, of which 4 were new.

Thirty-six Philippine species were obtained. The following have probably come in from Panay:

1. *Phabotreron nigrorum.*
2. *Prioniturus discurus.*
3. *Loriculus regulus.*
4. *Aethopyga magnifica.*
5. *Anthreptes chlorigaster.*
6. *Hyloterpe winchelli.*
7. *Pycnonotus goiavier.*
8. *Pitta atricapilla.*

Ceyx bournsi and *Halcyon winchelli* may have followed the same route. The former was obtained in Negros by us, and while the latter has

never been secured in the central islands I do not consider its occurrence there improbable. The finding of such very common species as *Pycnonotus goiavier* and *Pitta atricapilla* is worthy of note merely because we failed to obtain either in Romblon and Sibuyan.

The occurrence of *Chibia menagei* in Tablas is an ornithological puzzle. The only other species of the genus known from the Philippines, *Chibia borneënsis*, has straggled into the extreme southwestern islands from Borneo. The only explanation I can suggest for the occurrence of this well-differentiated form in Tablas is that it is derived from wind-driven stragglers of the Palawan species (*C. palawanensis*), from the northern islands of the Palawan group. The numerous islets and shoals intervening would afford occasional stopping places, and are, perhaps, indicative of a former closer connection between these islands, though why *Chibia* should have reached Tablas and be absent in Mindoro and Panay, if it came by this route, I can not see.

A second oddity is *Rhipidura sauli*, which has a close ally in *Rhipidura cyaniceps* of Luzon.

Iole cinereiceps is strikingly different from *Iole philippinensis*, the central Philippine form. It most nearly resembles *Iole monticola* of Cebu. Some intermediate form between the two may yet be discovered in the highlands of the central islands.

The occurrence of these three species, as well as that of *Dicaeum intermedium* in the place of *D. dorsale*, presents an obstacle to grouping this island with the central Philippines, which is greatly augmented by the negative characteristics of its bird fauna.

Of the 29 species previously listed as especially characteristic of the central islands, but four were found in Tablas; and I ought to state here that in the large series of *Loriculus regulus* obtained in Tablas, Romblon, and Sibuyan not a single male was found with as much orange on the head as is shown by Panay specimens in good plumage.

Alcyone is almost certainly absent. We searched the banks of the small streams for it in vain. The *Bucerotidae*, *Capitonidae*, and *Picidae* have not a single species, while *Dicrurus* is replaced by *Chibia*. *Dicaeum haematostictum* does not occur, and the absence of tailorbirds (*Orthotomus*) is especially striking. The *Timeliidae* are without a representative. *Rhipidura albiventris* is replaced by *R. sauli* and *Artamides panayensis* by *A. mindorensis*.

These facts, together with the entire absence of deer, lead me to the conclusion that Tablas has not been connected with Panay, at least since the latter island received its present fauna.

Romblon is a small island but 4 or 5 miles from Tablas. At present it is almost entirely under cultivation. But two small patches of forest remain on the island. Of the 47 species of birds which I found there, 25 are Philippine. With the exception of *Baza leucopais*, these have all been found in Tablas also, and *B. leucopais*, originally discovered in Palawan and since found in Samar by us, may be looked for almost anywhere in the Philippines.

It is not surprising that we should not have found such deep-woods forms as *Chibia menagei* and *Rhipidura sauli* in Romblon, as the few acres of forest remaining do not afford them a suitable habitat. The presence of *Iole cinereiceps* and *Dicaeum intermedium* will perhaps serve, however, to indicate the relationship of the now rapidly diminishing avifauna of the island. Romblon belongs, I believe, with Tablas, and the two islands must, like Siquijor, be given a place by themselves.

Sibuyan is a much more attractive field for the ornithologist than Romblon. It is separated from the latter island by a channel some 6 miles wide and about 100 fathoms deep. In its center the fine peak of Giting-giting rises to a height of 6,500 feet. To the south of Giting-giting is a deep canyon, with the soil and vegetation on its opposite sides quite distinct. Conifers grow at sea level—a most unusual sight in the Philippines.

Giting-giting was a perpetual temptation to me, and I twice climbed it to a height of 4,000 feet only to be driven back by the storms which hardly ceased to rage about the mountain during my stay. It is perhaps worthy of note that *Aethopyga magnifica* and *Hyloterpe winchelli* were obtained at the highest point reached, while *Ceyx bournsi* was abundant at a height of 2,000 feet.

The lowlands of Sibuyan were in many places abundantly clothed with forest, and the weather there was comparatively favorable for collecting during my stay, so that a good collection of the lowland birds was secured in a short time. Of the 65 species obtained, 36 were Philippine forms.

Not one of the four new species discovered in Tablas and Romblon was found in Sibuyan. *Iyngipicus menagei* and *Dicaeum sibuyanicum* were the only novelties obtained, although the discovery of *Cyanomyias coelestis*, hitherto known only from Basilan, Mindanao, and Dinagat, was quite as interesting to me as would have been the finding of a new species. *C. coelestis* is comparatively common on the island. Three specimens were secured and others seen.

Of the remaining species, *Phabotreron nigrorum*, *Alcyone cyanipectus*, *Prioniturus discurus*, *Loriculus regulus*, *Aethopyga magnifica*, *Anthothreptes chlorigaster*, and *Hyloterpe winchelli* are the only ones of interest. All of these are central Philippine forms, and have perhaps found their way into Sibuyan along the route indicated by the line of shoals which connects Sibuyan with Masbate. I can not believe that there has been actual connection here, however, for we are once more confronted with the absence of whole families like the *Bucerotidae*, *Capitonidae*, *Dicruridae*, and *Timeliidae*. No *Paridae*, *Cethiidae*, or *Pycnonotidae* were obtained, although the ground collected over was well suited to them. Representatives of the two former families may have been overlooked, however.

These facts, as well as the absence of deer, lead me to doubt the existence of any connection between Sibuyan and the islands to the south and east since the latter obtained their present characteristic fauna,

and the absence of the forms peculiar to Tablas and Romblon render it improbable that there has been any recent connection between them and Sibuyan.

I venture to prophesy that the first ornithologist who successfully attempts to collect at a high altitude on Giting-giting will make some interesting finds.

MINDORO.

The avifauna of Mindoro has not as yet received the attention which it deserves. The island is of good size, measuring 90 miles in greatest length by 50 in greatest width. Its interior is abundantly clothed with the densest of tropical forests. In the north center rises the magnificent Mount Halcon, the height of which, as obtained by triangulation, is 8,865 feet. A fine chain of mountains stretches away from Halcon to the south. Open grassy plains of large extent are to be found in the southern and western portions of the island, and there is excellent collecting ground for aquatic birds about Lake Naujan.

Unfortunately there are numerous drawbacks to offset these attractions. The climate is intolerably bad, rain falling in torrents much of the time during nine months of the twelve, and not infrequently during the other three. The coasts of the island, especially the western and southern, are populated by organized bands of thieves and cutthroats ("tulisanes"), who use Mindoro as a base of operations, and make piratical expeditions against the peaceable natives and Spanish planters on the neighboring islands. Several most fiendish deeds were perpetrated by these brutes during our stay in the island.

The interior of Mindoro is sparingly peopled by a race of almost naked savages, the "Mangyans," or "Manguyanes," who were represented to us as head hunters, cannibals, and what not, but proved to be harmless as children so long as they were decently treated.

One may scare the "tulisanes" without much exertion, for they are most desperate cowards, and very superstitious at that; he may easily make friends with the savages, but there is one dangerous enemy in Mindoro from which there is no escape—the pestiferous fevers bred by the decaying vegetation in the dense lowland forests—and the man who collects there can make up his mind beforehand to be ill. Mindoro has been not inaptly dubbed by the natives "the white man's grave."

During the comparatively short stay of the Steere expedition in Mindoro in 1888, most of our time was given to hunting the "timarau" (*Bubalus mindorensis*, Heude), and comparatively little work was done on the birds, yet several interesting new species were discovered. Not long after our departure Schmacker made a collection of birds in the vicinity of Mount Halcon, but most of his discoveries had been anticipated by the Steere expedition.

When Bourns and I returned to the island in 1891 we found that the well-known German collector, Doctor Platen, aided by his wife and a force of native hunters, had been in the island for more than a year

and had shipped extensive collections home. Knowing the thoroughness with which Platen's work is usually done, it did not seem to us worth while, under the circumstances, to give much time to the birds, and during that and our subsequent visit to the island we devoted ourselves chiefly to collecting mammals, reptiles, and land mollusca.

For some unexplained cause no account of Platen's collections has ever appeared, a fact which is greatly to be regretted.

Quite recently Everett undertook an expedition to the island, which he was unfortunately compelled to abandon before it was fairly begun.

Finally, Whitehead has attempted to work the highlands of Mindoro. Unfortunately he chose the worst possible months for visiting an island which has a sufficiently abominable climate at best, and in comparison with what he has accomplished in several other localities his results are disappointing.

As a result of all this collecting but 134 species are known from this large, well watered, and magnificently wooded island, and it is certainly true that much remains to be done in Mindoro.

Sixty-four of the known species are strictly Philippine forms. The following species are peculiar to the island so far as we at present know, though they may be discovered in the at present unknown islands Ylin and Lubang, or in smaller islands near Mindoro.

1. *Carpohaga mindorensis.*
2. *Phlogoenas mindorensis.*
3. *Penelopides mindorensis.*
4. *Centropus mindorensis.*
5. *Centropus steerii.*
6. *Prioniturus mindorensis.*
7. *Loriculus mindorensis.*
8. *Thriponax mindorensis.*
9. *Turdus mindorensis.*
10. *Geocichla cinerea.*
11. *Iole mindorensis.*

Upon comparing the remaining species with the corresponding Luzon forms, we note that the Mindoro species *Phlogoenas platenae*, *Penelopides mindorensis*, *Loriculus mindorensis*, *Thriponax mindorensis*, and *Ceyx cnerythra* are replaced in Luzon by *Phlogoenas luzonica*, *Penelopides manillae*, *Loriculus philippensis*, *Thriponax javensis*, and *Ceyx melanura*, respectively.

On the other hand, the following species are common to Luzon and Mindoro, most of them being confined to these islands and the smaller ones immediately adjacent:

1. *Phabotreron leucotis.*
2. *Carpophaga carola.*
3. *Porphyrio pulverulentus.*
4. *Alcyone cyanipectus.*
5. *Iyngipicus validirostris.*
6. *Dicrurus balicassius.*
7. *Chlorura brunneiventris.*
8. *Aethopyga flavipectus.*
9. *Dicaeum retrocinctum.*
10. *Dicaeum xanthopygium.*
11. *Prionochilus inexpectatus.*
12. *Zosterops aureiloris.*
13. *Brachypteryx poliogyna.*
14. *Hylocrpe albiventris.*
15. *Lanius validirostris.*
16. *Lalage melanoleuca.*
17. *Stoparola nigrimentalis.*

Turning now to the negative differences between the two islands, I propose to confine myself to cases in regard to which there can be no doubt, omitting mention of a number of genera which have not been

found in Mindoro, and which I believe will not be found there, though they may have been thus far overlooked.

Hydrocorax does not occur in Mindoro, although the island is seemingly remarkably well adapted to it. So of *Harpactes*, and of the three peculiar Luzon cookoos, *Centropus unirufus*, *Dasylophus superciliosus*, and *Lepidogrammus cumingi*. *Bolbopsittacus* is lacking and so are *Chrysocolaptes* and *Microstictus*. There seems to be no *Oriolus* of the *O. steerii* type. No *Anthothreptes* has as yet been found, though I spent a number of days collecting in cocoanut groves. Tailor birds (*Orthotomus*) are certainly absent, and *Cittocincla* is probably so. *Irena* is certainly, and *Zosterornis* probably, lacking.

The facts above enumerated, as well as the absence of the characteristic Luzon mammals in Mindoro, and that of *Bubalus mindorensis* in Luzon, have forced me to the conclusion that the faunae of the two islands were originally fundamentally distinct.

It certainly requires no stretch of the imagination to suppose that the Luzon birds found in Mindoro may have crossed at Puerto Gallera by way of Isla Verde.

LUZON, MARINDUQUE, AND CATANDUANES.

The avifauna of Luzon is better known than that of any other island of the Philippine group. Nearly every ornithological collector who has visited the archipelago has been forced to go there whether he would or not, and most of the collectors who have visited Manila have improved the opportunity to do more or less work, although their operations have been for the most part confined to the immediate vicinity of that city.

Luzon is the largest of the Philippine Islands, and with its extensive fresh-water lake, great rivers, and lofty forest-clad mountains it offers splendid collecting ground.

My personal familiarity with the island is slight. During our first visit to the Archipelago neither Bourns nor I fired a gun there. At the beginning of our second visit we went to the Laguna de Bay for three weeks, to "break in," but were unfortunate in the locality we selected, which was too far from the forest, and were hindered by torrents of rain which fell almost without interruption during our stay.

My last trip in the islands was to have been to North Luzon and the Batanes and Babuyanes groups. To my everlasting regret, an attack of typhoid fever made it necessary for me to abandon this long-cherished plan and leave the Philippines once for all.

In spite of bad collecting ground and worse weather, the results of our three weeks' work in Luzon were such as to convince us that much remained to be done there, and it was with genuine satisfaction that we learned of the intended visit to the island of Mr. John Whitehead, so well known from his remarkable work on Mount Kina Balu, in Borneo.

The splendid results of Whitehead's work in Luzon have been made known to the readers of the *Ibis* through the interesting papers of Mr. W. R. Ogilvie Grant.

Whitehead not only collected in various parts of the island remote from the capital, but pushed into the highlands, reaching ground where no collector had ever set foot before. Just what it means to get to the places which he reached, and to stay there and collect after getting there, no one can realize who has not had experience with Spanish officialdom and the Philippine native, his country, and its climate.

Of the 286 species of birds recorded from Luzon, no less than 136 are Philippine species. The following seem to be peculiar to this island and the smaller ones immediately adjacent to it:

1. *Turnix ocellata.*
2. *Phabotreron leucotis.*
3. *Ptilopus marchei.*
4. *Phlogoenas luzonica.*
5. *Scops megalotus.*
6. *Scops longicornis.*
7. *Scops whiteheadi.*
8. *Batrachostomus microrhynchus.*
9. *Halcyon lindsayi.*
10. *Penelopides manillae.*
11. *Centropus unirufus.*
12. *Dasylophus superciliosus.*
13. *Lepidogrammus cumingi.*
14. *Prioniturus luconensis.*
15. *Prioniturus montanus.*
16. *Bolbopsittacus lunulatus.*
17. *Loriculus philippensis.*
18. *Chrysocolaptes haematribon.*
19. *Hierostictus funebris.*
20. *Oriolus albiloris.*
21. *Oriolus isabellae.*
22. *Loxia luzoniensis.*
23. *Pyrrhula leucogenys.*
24. *Mirafra philippinensis.*
25. *Rhabdornis mystacalis.*
26. *Dendrophila mesolenca.*
27. *Eudrepanis jefferyi.*
28. *Cinnyris flagrans.*
29. *Cinnyris whiteheadi.*
30. *Cinnyris excellens.*
31. *Dicaeum obscurum.*
32. *Zosterops meyeni.*
33. *Zosterops luzonica.*
34. *Lusciniola seebohmi.*
35. *Cettia seebohmi.*
36. *Chimarrhornis bicolor.*
37. *Orthotomus derbianus.*
38. *Orthotomus chloronotus.*
39. *Cittocincla luzoniensis.*
40. *Zosterornis striatus.*
41. *Zosterornis whiteheadi.*
42. *Zosterornis dennistouni.*
43. *Pseudotharrhaleus caudatus.*
44. *Irena cyanogastra.*
45. *Artamides striatus.*
46. *Rhipidura cyaniceps.*
47. *Rhinomyias insignis.*
48. *Siphia enganensis.*
49. *Siphia herioti.*
50. *Callaeops periopthalmica.*
51. *Pitta kochi.*

We have, then, 51 species not known from the Philippines outside of Luzon, Marinduque, and Catanduanes. Eleven of the genera represented are peculiar, and no one can object to Steere's assigning Luzon and its small neighbors to a place of their own. It should be remembered, however, that of the above-enumerated species 33, including all but 3 of the peculiar genera, were discovered by Whitehead. Just how many of them are highland forms we are not informed, but certainly a considerable number. Until the highlands of the remaining islands have been worked as thoroughly as have those of Luzon, there is, therefore, danger of exaggerating the distinctness of the Luzon avifauna.

Marinduque is an island nearly round in outline, and about 40 miles in diameter. It lies some 20 miles from the coast of Luzon, but the intervening space is partially bridged by several islets, and the water is shallow.

The birds of this island are known chiefly through the collections of the Steere expedition, made in 1888. Our headquarters were at Boac, and there was no really good collecting ground within reach. We obtained 74 species of birds, however. Every one of the Philippine species obtained in Marinduque is also recorded from Luzon, while the occurrence of such species as *Hydrocorax hydrocorax*, *Penelopides manillae*, *Dasylophus superciliosus*, *Lepidogrammus cumingi*, *Prioniturus luconensis*, *Loriculus philippensis*, *Chrysocolaptes haematribon*, *Microstictus funebris*, and *Cittocincla luzoniensis* is proof positive that Marinduque is to be considered a fragment of Luzon.

Catanduanes is a larger island than Marinduque. It lies east of the southern portion of Luzon, and is distant about 6 miles from that island. I know nothing of it personally, but my friend, Sōr. José Quadras, the well-known conchologist, who has gathered land mollusca on the island, informed me that it was mountainous and abundantly wooded.

Its birds are known to us only through the collections of Whitehead, the first ornithologist to visit it.

As in the case of Marinduque, all the Philippine species recorded are also known from Luzon, while the occurrence of the following characteristic Luzon species makes it safe for us to class it as another detached fragment of that island:

1. *Phabotreron leucotis.*
2. *Dasylophus superciliosus.*
3. *Loriculus philippensis.*
4. *Iyngipicus validirostris.*
5. *Microstictus funebris.*
6. *Cinnyris ercellens.*
7. *Orthotomus derbianus.*
8. *Cittocincla luzoniensis.*

FUGA.

Fuga is one of the Babuyanes islands. It lies some 15 miles off the north coast of Luzon. Mr. Whitehead made a brief enforced stay there, being driven off shore while attempting to make Cape Engaño.

One of the seven species of birds obtained makes us wish that he had tarried long enough to make a more complete collection. In *Hypsipetes fugensis* we have the only known Philippine representative of this genus. The remaining forms give us no clew as to whether or not there is a close relationship between the Fuga and Luzon birds. The collector who is plucky enough to face the strong winds and dangerous currents which make navigation among the Batanes and Babuyanes islands so dangerous that the mail steamers make the run but twice a year, "weather permitting," will make valuable discoveries, provided he can reach the more important islands of the chain and contrive to live on them after he gets there.

SAMAR, LEYTE, AND PANAON.

For the purposes of this paper Samar and Leyte may be considered to form a continuous area, for the channel which separates them is very narrow and is dotted with numerous islets, so that it does not form an appreciable barrier. The first collections of importance in Samar were those made by the Steere expedition. Bourns and I made a second trip to the island upon our return to the Philippines, and more recently Whitehead has visited it twice, his first collection having unfortunately been destroyed.

The first collector to visit Leyte was Everett, who worked at the southern extremity of the island. Steere made a short collecting trip in the vicinity of Tacloban in 1888, and Whitehead concluded his Philippine work at the northern end of the island after an ineffectual attempt to reach Biliran.

Whitehead was unable to reach good collecting ground in the highlands of either Samar or Leyte.

One hundred and fifty species are known from Samar, against 119 from Leyte. The only differences worth mentioning that are brought out by comparing the species known from the two islands are due to the occurrence in southern Leyte of a few Mindanao species, which apparently do not range northward into Samar.

The following peculiar species are sufficient to give to the avifauna of these islands a good deal of individuality:

1. *Alcyone flaminicola.*
2. *Ceyx samarensis.*
3. *Hydrocorax semigaleatus.*
4. *Penelopides samarensis.*
5. *Bolbopsittacus intermedius.*
6. *Loricalus worcesteri.*
7. *Iyngipicus leytensis.*
8. *Chrysocolaptes rufopunctatus.*
9. *Thriponax pectoralis.*
10. *Sarcophanops samarensis.*
11. *Corvus samarensis.*
12. *Oriolus samarensis.*
13. *Orthotomus samarensis.*
14. *Zosterornis pygmaeus.*
15. *Zosterornis nigrocapitatus.*
16. *Rhabdornis inornatus.*
17. *Ptilocichla minuta.*
18. *Irena ellae.*
19. *Pericrocotus leytensis.*
20. *Muscicapula samarensis.*
21. *Hypothymis samarensis.*
22. *Cyanomyias helenae.*

Panaon is known to us only through the collections of Everett. Of the 20 species of birds which he obtained, only *Chrysocolaptes rufopunctatus*, *Thriponax pectoralis*, and *Hydrocorax semigaleatus* afford evidence as to the zoological position of the island. These all point to a close relationship with Leyte, of which Panaon probably at one time formed a southern projection.

THE RELATIONSHIP BETWEEN LUZON, SAMAR, AND LEYTE.

I have already given a list of 51 species not recorded outside of Luzon and the small islands immediately adjacent to it. In comparing the birds of Luzon with those of Samar and Leyte we must add to this list

the following species common to Luzon and Mindoro, but not known to range to the south:

1. *Carpophaga carola.*
2. *Porphyrio pulverulentus.*
3. *Iyngipicus validirostris.*
4. *Dicrurus balicassius.*
5. *Chlorura brunneiventris.*
6. *Aethopyga flaripectus.*
7. *Dicaeum retrocinctum.*
8. *Dicaeum xanthopygium.*
9. *Lanius validirostris.*
10. *Hyloterpe albiventris.*
11. *Lalage dominica.*
12. *Brachypteryx poliogyna.*

This gives us the rather imposing total of 63 Luzon forms not found in Samar as yet, and if we add the 22 Samar species not recorded from Luzon the total difference between the two regions is great. I wish, however, to call attention to certain common features in the avifaunae of the two islands. The only families of land birds of which representatives have been found in Luzon, but not in Samar or Leyte, are the *Strigidae*, *Caprimulgidae*, *Fringillidae*, *Alaudidae*, and *Paridae*. It can hardly be doubted that, with the possible exception of the *Fringillidae*, representatives of all these families will eventually be found in Samar and Leyte, and in the case of the *Fringillidae* we must remember that the highlands of these islands are yet to be heard from.

Apart from the practical agreement of the families represented, several of which are confined in the Philippines to the eastern and southern islands, we find the following genera ranging from Mindanao to Luzon, in some cases even from Tawi Tawi to Luzon, but not recorded from the central Philippines:

1. *Phlogoenas.*
2. *Microhierax.*
3. *Pithecophaga* (probably).
4. *Bubo.*
5. *Scops.*
6. *Hydrocorax.*
7. *Lyncornis.*
8. *Harpactes.*
9. *Bolbopsittacus.*
10. *Microstictus.*
11. *Eudrepanis.*
12. *Zosterornis.*
13. *Poliolophus.*
14. *Irena.*
15. *Muscicapula.*
16. *Pericrocotus.*
17. *Surniculus.*

It would seem, then, that there is a general relationship between the chain of islands forming the eastern and southern Philippines, and as a further evidence of the closeness of this relationship it will be found that at each of the natural barriers in this chain there is more or less overlapping of species. *Harpactes ardens*, *Surniculus velutinus*, *Prioniturus discurus*, *Anthothreptes griseigularis*, *Dicaeum rubriventer*, *Dicaeum luzoniense*, *Hyloterpe philippinensis*, *Lalage minor*, and *Poliolophus urostictus* are species which illustrate the partial overlapping of the avifaunae of Samar and Luzon.

Such a large number of genera are known to have different representative species in Samar and Luzon as to warrant the supposition that a considerable amount of difference will remain in the avifaunae of the two islands when our knowledge of Samar and Leyte becomes as complete as is our knowledge of Luzon at present, but when we remember that the apparent differences are due in

no small degree to the fact that the highlands of the more southern islands are still quite unknown, it seems probable that further work will tend to decrease rather than to increase them.

It is perhaps worth while to note in passing that Samar seems to be the northern limit in the Philippines of the genera *Macronus*, *Ptilocichla*, and *Sarcophanops*. Some of these genera may yet be discovered in Luzon, but it seems to me improbable that they should have been overlooked by Whitehead, who spent upward of two years in the island.

One Samar-Leyte form has always puzzled me. Why should *Thriponax javensis* give way in Samar and Leyte to so well-marked a species as *Thriponax pectoralis*, and then reappear in Luzon?

THE RELATIONSHIP BETWEEN SAMAR, LEYTE, AND MINDANAO.

With the single exception of *Pericrocotus leytensis* every one of the peculiar Samar-Leyte species is known to have an ally in Mindanao, and most of them have very close allies. I believe that *Pericrocotus*, which reappears in Sulu, will eventually be found in Mindanao and the other intervening islands.

A still further indication of the closeness of the relationship between the birds of Samar, Leyte, and Mindanao is found in the following species which are common to the three islands, but are lacking in the central and western islands. Species that range northward to Luzon or Mindoro are prefaced by an *, those that range westward to Cebu Bohol, or Siquijor by a †:

* 1. *Phabotreron amethystina.*
† 2. *Phabotreron brevirostris.*
3. *Phlogoenas crinigera.*
4. *Scops everetti.*
† 5. *Microhierax meridionalis.*
6. *Pithecophaga jefferyi.*
* 7. *Harpactes ardens.*
8. *Sarniculus reluctinus.*
9. *Centropus melanops.*
10. *Microstictus fuliginosus.*
11. *Dicrurus striatus.*
12. *Eudrepanis pulcherrima.*
13. *Aethopyga bella.*
14. *Arachnothera flammifera.*
15. *Arachnothera philippinensis.*
* 16. *Anthothreptes griseigularis.*
17. *Dicaeum cinereigulare.*
18. *Dicaeum everetti.*
19. *Prionochilus olivaceus.*
† * 20. *Hyloterpe philippinensis.*
21. *Orthotomus frontalis.*
22. *Zosterornis capitalis* (Leyte only).
23. *Macronus mindanensis.*
24. *Iole everetti.*
* 25. *Poliolophus urostictus.*
26. *Artamides kochii.*
* 27. *Lalage minor.*
28. *Pitta steerii.*
29. *Rhinomyias ruficauda.*

The relationship between the "Eastern Philippines" (Samar and Leyte) and Mindanao is, in my judgment, closer than that between any other two areas which Steere has separated. I am tempted to say that the resemblances outweigh the differences. Remembering that 4 species of *Centropus*, 4 of *Carpophaga*, 2 of *Cettia*, 2 of *Ninox*, 6 of *Cinnyris*, 6 of *Dicaeum*, 4 of *Halcyon*, 2 of *Hierococcyx*, 2 of *Hyloterpe*, 2 of *Lyncornis*, 3 of *Oriolus*, 2 of *Orthotomus*, 3 of *Scops*, 3 of *Zosterops*, 3 of *Zosterornis*, 2 of *Muscicapula*, and 3 of *Siphia* have been found in Luzon alone, one can not but wonder whether, if there were actual land con-

nection between Luzon and Mindanao, the differences between the birds in the various localities where collections have been made might not be nearly as great as under existing conditions.

At all events, the practical identity of the families represented in the eastern chain of islands, the occurrence in it of the genera above enumerated, which in the Philippines are nearly or quite confined to it, as well as the overlapping of species at each of the breaks in it, seem to me to be indicative of a much closer relationship between the islands composing it than exists between any of them and other islands of the Philippine group.

MINDANAO AND BASILAN.

Mindanao is, next to Luzon, the largest island in the Philippines. It extends 250 miles north and south by 270 east and west. Its rivers, lakes, forests, and mountains are quite equal to those of Luzon, and afford the most tempting collecting grounds remaining in the Philippines. There is, however, a decided drawback to ornithological investigation in this island in the fanatically hostile Mohammedan tribes which populate its interior.

Neither the Steere nor the Menage expeditions attempted any serious ornithological work here, our time in each instance being chiefly given to the collection of coral, while native hunters were sent to the woods for birds. The best work in Mindanao has been done by Everett. Platen and his wife were for a long time at Davao, but with a single exception all their novelties were described by Steere from specimens obtained by the Steere Expedition before Blasius, into whose hands Platen's material fell, was ready to publish.

Although 207 species of birds are known from Mindanao, it is certain that many interesting forms remain undiscovered, especially in the highlands, which are as yet entirely unknown. Mount Apo is so conveniently near Davao that it is to be hoped some adventurous collector will soon give us some knowledge of the upland avifauna of this great island.

Basilan is a small island distant about 8 miles from the peninsula in which Mindanao extends to the southwest. It is connected with this peninsula by a line of soundings so shallow as to suggest a former actual land connection. Basilan is well watered and well wooded. Its surface is broken, but it has no very high mountains. Hunting is safe enough near Isabella, the capital, but it is dangerous in the interior on account of the hostility of the natives.

The first collections on the island were made by Steere, who was followed by Everett. Later the Steere and Menage expeditions worked there. The total number of species of birds recorded is 119. One hundred and nine of the Mindanao and 80 of the Basilan species are Philippine, and they afford an interesting study.

Steere has classed Mindanao and Basilan together, making them constitute a subprovince, the "Southern Philippines," and their bird

faunae certainly have much in common. The following species are, so far as we at present know, peculiar to these two islands and the smaller ones immediately adjacent to them:

1. *Phabotreron occipitalis.*
2. *Ninox spilocephala.*
3. *Batrachostomus septimus.*
4. *Ceyx mindanensis.*
5. *Alcyone argentata.*
6. *Hydrocorax mindanensis.*
7. *Loriculus apicalis.*
8. *Iyngipicus fulvifasciatus.*
9. *Chrysocolaptes lucidus.*
10. *Sarcophanops steerii.*
11. *Oriolus steerii.*
12. *Orthotomus cinereiceps.*
13. *Iole rufigularis.*
14. *Irena melanochlamys.*
15. *Edolisoma mindanensis.*
16. *Muscicapula mindanensis.*
17. *Hypothymis superciliaris.*

The following additional species are common to the two islands and range to the north, but seem to reach their southwestern limit in Basilan.

1. *Phlogoenas crinigera.*
2. *Harpactes ardens.*
3. *Centropus melanops.*
4. *Halcyon gularis.*
5. *Dicrurus striatus.*
6. *Eudrepanis pulcherrima.*
7. *Arachnothera flammifera.*
8. *Dicaeum rubriventer.*
9. *Hyloterpe philippinensis.*
10. *Megalurus ruficeps.*
11. *Orthotomus frontalis.*
12. *Zosterornis capitalis.*
13. *Artamides kochii.*

Cinnyris juliae, *Dicaeum hypoleucum*, *Dicaeum mindanense*, and *Zeocephus cinnamomeus* on the other hand, are common to Mindanao and Basilan, and range to the westward, but do not get farther north than Mindanao.

So much for the resemblances between the two islands. There are, however, a number of more or less important differences. Eight species are, so far as we at present know, peculiar to Mindanao. They are:

1. *Bubo gurneyi.*
2. *Penelopides affinis.*
3. *Cranorrhinus leucocephalus.*
4. *Bolbopsittacus mindanensis.*
5. *Prionochilus bicolor.*
6. *Parus nehrkornae.*
7. *Orthotomus nigriceps.*
8. *Ptilocichla mindanensis.*

Some of these apparent differences will doubtless disappear as we learn more of the birds of Basilan, which are much less well known than those of Mindanao, but that island also has its peculiar species, and there is little probability that more than one of them exists in Mindanao. They are as follows:

1. *Phabotreron brunneiceps.*
2. *Penelopides basilanicus.*
3. *Macronus striaticeps.*
4. *Ptilocichla basilanica.*
5. *Dendrobiastes basilanica.*

We may admit that such Mindanao forms as *Bubo gurneyi*, *Prionochilus bicolor* and *Parus nehrkornae* may have been overlooked in Basilan, and that *Dendrobiastes basilanica* may have escaped detection in Mindanao, but it is decidedly improbable that genera like *Cranorrhinus* and *Bolbopsittacus* should have escaped all the collectors who have visited Basilan.

When we note further that *Phabotreron brevirostris* is replaced in Basilan by *P. occipitalis*, *Phabotreron amethystina* by *P. brunneiceps*, *Penelopides affinis* by *P. basilanica*, *Macronus mindanensis* by *M. striaticeps*, and *Ptilocichla mindanensis* by *P. basilanica*, as well as that *Arachnothera philippinensis*, *Anthothreptes griseigularis*, *Chloropsis flaripennis*, *Iole ereretti*, and *Zosterornis plateni* all apparently reach their southern limit in Mindanao, it becomes evident that the relationship between the birds of Mindanao and Basilan does not by any means amount to identity.

The facts may be explained by supposing that Basilan was once a part of Mindanao, or at all events was more closely connected with that island than it is at present; that it has been cut off long enough to allow of the differentiation of its representative species allied to Mindanao forms, and that in the meantime a connection has come into existence between Leyte and Mindanao sufficiently good to allow of the entrance of those Samar-Leyte forms which are common in Mindanao, but wanting in Basilan.

Possible confirmation of such a theory might be found in the ranging of *Zosterornis capitalis* into southern Leyte, and that of *Iole philippinensis* into northern Mindanao. Each of these forms might be considered to have recently crossed, the one going north, the other south. Manifestly, however, the absence of *Zosterornis capitalis* in northern Leyte and Samar, and that of *Iole philippinensis* in southern Mindanao admits of other explanation than the mere lack of time to spread there.

At present the gap between Basilan and Mindanao is slightly smaller than that between Mindanao and Panaon, which island may be regarded as a southern prolongation of Leyte. A single sounding "80 fathoms, no bottom," is shown on the chart about the middle of the passage. In the absence of any information as to the depth of water between Dinagat and Leyte, it is perhaps useless to attempt to theorize further as to possible past land connections at this point.

DINAGAT, CAMIGUIN, NIPAH, BAZOL, SAKUYOK, AND MALANIPA.

Dinagat is the largest and best known of these islands. Mr. Everett obtained 39 species of birds there, and no collector has since visited the locality. The occurrence of *Alcyone argentata*, *Loriculus apicalis*, and especially that of *Sarcophanops steerii* marks the island as belonging with Mindanao.

Camiguin is a volcanic island of small size lying a short distance from the north shore of Mindanao. Nipah, Bazol, and Sakuyok are, according to Lord Tweeddale, "situated to the north of the shores of Mindanao, and are only separated from that island by narrow channels." They are too small to be named in any of my charts. But 13 species of birds were obtained from the three localities by Mr. Everett, the only collector who has visited them. The species procured are all common Mindanao forms.

The occurrence of *Cranorrhinus leucocephalus* in Camiguin serves to indicate the relationship with Mindanao which might have been expected.

Malanipa is a tiny island lying to the east of the southwest extremity of Mindanao. Half a day's work was done on it by a party from the "Challenger." *Eudynamis mindanensis*, *Myristicivora bicolor*, *Haliastur intermedius*, *Tanygnathus luconensis*, *Pelargopsis gigantea*, *Numenius phaeopus*, *Cinnyris juliae*, *Heteractitis brevipes*, and *Hypothymis azurea* were the only species obtained, and all of them are known from Mindanao.

SULU, TAWI TAWI, AND BONGAO.

Sulu and Tawi Tawi lie to the southwest of Basilan, and are connected with that island by a line of shallow soundings hardly anywhere exceeding 100 fathoms. Sulu has long been the home of the Sultans who have ruled the piratical Mohammedan population of the southern Philippines, and is a veritable hornet's nest. When we were there with the Steere expedition in 1887 collecting was absolutely out of the question, a pitched battle having just been fought between the Spanish garrison and the natives. In 1891 we managed to collect, though at serious personal risk.

The native forest in the part of the island near the town of Sulu was cleared away to a large extent by the slaves of the "Moros" in the days before the advent of steam gunboats and Gatling guns, when piracy was a more profitable vocation than it is at present. In place of the original forest enormous numbers of fruit trees were planted, so that most of the wooded district near the town is artificial and does not afford the best of collecting. There are several well-wooded hills in the interior of the island, but it was out of the question to attempt to reach them at the time of our visit.

Guillemard was the first to make important collections in Sulu, although a few specimens had previously been obtained there by Burbidge. Platen afterwards visited the island, and Bourns and I spent some six weeks there in 1891. The total number of species recorded up to date is 108.

Tawi Tawi is almost entirely covered by forest. There are several piratical settlements on its southern coast, but its northern side is uninhabited except for a few native huts near the Spanish blockhouse at Tataän, where reside the governor, captain of the port, postmaster, etc. (all combined in one man), also a Spanish lieutenant and thirty to fifty native soldiers.

Guillemard touched at Tawi Tawi, but did not collect there. The first collections ever made on the island were those of Bourns and myself. Everett has since visited Sibutu and Bongao, and has sent his collectors to Tawi Tawi. The total number of species recorded is 97.

We touched at Bangao on our way to Tawi Tawi, but did not collect

there. Bongao is so small, and is separated from Tawi Tawi by so narrow a stretch of water, that it is almost a pity to give it the dignity of a separate island. Since it has appeared as such, in Sharpe's table in the *Ibis*, I shall retain it to avoid confusion.

In this connection I may remark that I have discarded Malamani from the list of islands. I doubt if the channel which separates it from Basilan is 500 yards wide, and I have treated it as a part of that island.

There is nothing in the results of Everett's work to indicate that Bongao is anything more zoologically than a part of Tawi Tawi, and I shall so consider it in this paper.

Of the Sulu birds, 53 are Philippine species, of the Tawi Tawi birds, 51.

An analysis of these species will, I think, prove that Sulu and Tawi Tawi should be classed together, and that they can not be added to the Basilan-Mindanoa group, but must stand by themselves.

The following species are peculiar to the Sulu-Tawi Tawi group, at most ranging to Sibutu:

1. *Anthracoceros montani.*
2. *Tanygnathus burbidgei.*
3. *Loriculus bonapartei.*
4. *Iyngipicus ramsayi.*
5. *Aethopyga arolasi.*
6. *Dicaeum assimilis.*
7. *Hyloterpe homeyeri.*
8. *Macronus kettlewelli.*
9. *Iole haynaldi.*
10. *Artamides guillemardi.*
11. *Edoliisoma everetti.*
12. *Rhinomyias ocularis.*

In addition to these 12 exceptionally well-marked species common to the two islands we have *Ninox regi* and *Pericrocotus marchesae* recorded from Sulu alone, and *Phabotreron cinnereiceps*, *Phlogoenas menagei*, *Prioniturus verticalis*, and *Oriolus cinereogenys* recorded from Tawi Tawi alone.

In the case of *Prioniturus* we are in all probability dealing with a real difference, for *Prioniturus discurus* is certainly abundant enough in Sulu, and just as certainly not obtainable near Tataän, in Tawi Tawi. There is a bare possibility that *P. verticalis* has been overlooked in Sulu, and *P. discurus* in Tawi Tawi, which would give us here two species of the genus in each island, but this is improbable.

The other apparent differences will, I think, disappear as the birds of the two islands become better known.

The line of demarcation between Basilan and Sulu is on the whole quite sharp. A few forms, like *Cinnyris juliae*, range westward through the chain, but the absence of such genera as *Hydrocorax*, *Penelopides*, *Harpactes*, *Chrysocolaptes*, *Sarcophanops*, *Dicrurus*, *Eudrepanis*, *Arachnothera*, *Orthotomus*, *Zosterornis*, *Ptilocichla*, *Poliolophus*, *Irena*, *Muscicapula*, and *Cyanomyias*, together with the occurence of *Anthracoceros* and *Chibia*, indicate a greater degree of distinctness in the avifaunae of the two areas than I had anticipated.

LAPAC AND SIASSI.

Lapac and Siassi lie midway between Sulu and Tawi Tawi. Guillemard is the only collector who has visited them. The only one of the few species of birds obtained there by him which throws any light on their zoological position is *Artamides guillemardi*, but we have no cause for doubting that in this case the geographical and zoological relationships correspond, and the islands belong to the Sulu-Tawi Tawi group.

SIBUTU.

Much interest attaches to Mr. Everett's recent work in Sibutu, which had been up to that time held, even by himself, to be a Bornean island. The opinion advanced by Guillemard, and reiterated by Everett, that the Sibutu Passage marked the western boundary of the Philippines, zoologically speaking, has now been shown to be erroneous.

The old ideas were based not so much on the avifauna of Sibutu, which was almost unknown, as on the supposed conformation of the sea bottom, the charts indicating "500 fathoms, no bottom," in the middle of the Sibutu Passage, as well as at a point nearer the Tawi Tawi shore. Recent soundings have failed to establish any such depth of water in the positions indicated, and it has also been shown that Sibutu lies *barely* within the hundred fathom line of Borneo.

Thanks to Mr. Everett's efforts, the number of birds known from Sibutu has been raised to 36, and, although the island is apparently poor in species, the presence of such forms as *Macropygia tenuirostris*, *Pelargopsis gigantea*, *Eudynamis mindanensis*, *Prioniturus verticalis*, *Tanygnathus lucouensis*, *Corrus philippinus*, *Sarcops calvus*, *Calornis panayensis*, *Oriolus chinensis*, *Ciungris jugularis*, *Hyloterpe homeyeri*, *Iole haynaldi*, *Artamides guillemardi*, *Siphia philippinensis*, and *Pitta erythrogastra* leaves no room for doubt that Sibutu is zoologically as well as politically one of the Philippine Islands.

Pitta muelleri is the only strictly Bornean form yet obtained there.

The island has two peculiar species, *Scops sibutensis* and *Dicaeum sibutense*, but on the whole may probably be held to belong with the Sulu-Tawi Tawi group.

SUMMARY.

I will now briefly restate the conclusions thus far reached.

1. The Philippines zoological and the Philippines political are not identical areas.

2. Cagayan Sulu, Balabac, Palawan, and the Calamianes islands are Bornean.

3. The line of demarcation between the Philippine and Bornean islands passes between Sibutu and the coast of Borneo, and thence northward through the Sulu Sea and Mindoro Strait.

It remains to be determined whether it runs to the east or the west of the Cujos Islands.

4. The line between the Philippine and Formosan islands also remains to be determined.

5. The Philippines can not be divided into a number of zoologically equivalent groups, but do naturally fall into groups, some of which are much less sharply differentiated than others.

A close relationship exists between the degree of difference in the avifaunae of any two groups and their present and past geographical relationship, those islands which have been longest and most completely cut off from their neighbors showing the highest degree of differentiation. In this connection it is needless to remark that the depth of channels is much more important than their width in estimating the probable duration of isolation.

6. The Central Philippines, comprising the islands Negros, Panay, Guimaras, and Masbate, form a well-defined natural group, though in the case of Masbate there are indications of immigration from Luzon.

7. Cebu can not be regarded as one of the central group. It is separated from Negros by a very deep though narrow channel, and must be given a place by itself. It shows a slight admixture of eastern and southern forms.

8. Siquijor is an island of very recent origin. It has been populated by stragglers from other islands, and its three peculiar species have been developed from allied forms under the influence of changed environment.

9. Tablas, Romblon, and Sibuyan show no evidence of having been connected with any of the larger islands. Tablas and Romblon should probably be classed together.

10. There are abundant evidences of the original distinctness of the faunae of Luzon and Mindoro, which may be expected to increase as our knowledge of Mindoro birds increases.

11. Bongao, Tawi Tawi, Lapac, Siassi, and Sulu form another natural group, to which Sibutu must probably be added. The differences between the birds of this group and those of Mindanao and Basilan are great.

12. Stretching from Basilan to Luzon we have a chain of islands between which the zoological relationship is very close. This is proven by the mammals as well as by the birds, such genera as *Sciurus*, *Galcopithecus*, and *Tarsius* extending throughout the chain, although not found in the central and western islands.

13. Basilan probably at one time formed a part of Mindanao. It has been separated long enough to allow of the development of a number of representative forms from Mindanao species. A considerable number of species have apparently entered Mindanao since Basilan was cut off, and have hence failed to gain a foothold in the latter island.

14. The relationship between the birds of Mindanao and those of Samar and Leyte is very close, though possibly less so than that between those of Mindanao and Basilan.

15. The widest gap in the chain is that between Samar and Luzon. No final conclusions can be reached as to the precise relationship of the islands in this chain, however, until the highland avifaunae of the southern islands are better known.

I have not sufficient familiarity with the birds of the larger land masses adjacent to the Philippines to intelligently discuss the relationships of the Philippine birds as a whole, and, leaving this interesting question to wiser heads than mine, I pass to the consideration of some of the more general problems of distribution and development raised by the known distribution of the birds within the limits of the archipelago.

STEERE'S LAW OF DISTRIBUTION.

While the question of the relationships between the birds of the various islands is not without its interest, other and more important problems, which can not be so readily disposed of, are presented by the facts of distribution of the resident birds. So far as I know, Steere has been the only one to attempt to discuss these more general questions on the strength of the data furnished by Philippine species.

In his paper on "The Distribution of Genera and Species of Non-migratory Land Birds in the Philippines" he makes a somewhat detailed examination of the birds obtained by the Steere expedition, as the result of which he arrives at the conclusion that "the genus is represented by but a single species in a place." He believes that Philippine species and varieties are geographical or local groups depending on local causes for their existence, and that they show isolation to be the first and necessary step in the formation of species. It is evident that when he speaks of isolation he refers to geographical isolation, for in describing the species which he holds confirm his law he says: "In 53 genera, with 153 species, each genus is represented in the Philippines by two or more species, each of which exists in a limited area of its own, sharply separated by sea channels from the similar areas occupied by the other species of the same genus."

In the paragraph which precedes the one in which he states his law he says that "there results 145 genera out of 150, and 302 species out of 312, or 29 from every 30 of the genera, and over 30 from every 31 of the species, so distributed in the islands that no two species nearly enough allied to be put in the same section or subgenus are found existing in the same island." This statement, as well as the one above quoted, shows that by "place" he means island.

Steere confined himself to an examination of his own birds and those collected by Moseley, Bourns, and myself in 1887–88, in the belief that "these collections, while not comprising all species known from the islands, are so nearly complete that any just conclusions drawn from them must be accepted as truth, which further exploration will only strengthen."

He divides the genera discussed into five lists, A, B, C, D, and E.

In List A he includes 6 genera, with 12 species, which are left out of consideration because some or all of the species are migratory.

In List B he places 75 genera, each of which, he says, was found represented in the Philippines by a single species.

List C includes 53 genera, with 153 species, which he holds to be distributed in strict conformity with his law: i. e., with but one species of a genus in an island.

Of List D he says: "In 17 genera, with 74 species, each genus is represented in the islands by several species, two or more of which may be found inhabiting the same island; but the species thus found together with the same generic name differ greatly in size or coloring or other structures, and belong to different natural sections or subgenera." He adds that "these sections or subgenera themselves may each be represented in the archipelago by several species; but where this occurs each species is found isolated and separated from all the other species of the same subgenus, just as are the species of the genera given in List C."

Finally, List E includes "5 genera and 10 species, in which 2 species of the same genus were found existing together in the same islands, these not differing enough to appear to warrant placing them in distinct sections of the genus."

Adding the genera with but one Philippine species (List B), those with several species, no two of which occur in the same area (List C), and the 17 genera of List D, which he implies should really be further subdivided, and would then come under his law, he obtains a total of 145 genera out of 150, and 302 species out of 312, distributed in conformity with his law.

These conclusions, if true, would be of far-reaching importance, and I can not close this paper without a reexamination of the facts, first because the data of which Steere chose to avail himself were very incomplete, and, second, because I dissent from some of the conclusions which he drew from the data of which he made use.

In order that the comparison may be the more direct, I shall confine myself to a consideration of the resident land birds, and shall include the birds of the Palawan group of islands with those of the Philippines proper. I shall also retain in the main Steere's method of grouping the genera, changing slightly the order in which the groups are taken up.

Considering first the genera which so far as we at present know have but one species each in the Philippines, we have:

List B.

Acridotheres.	*Artamus.*	*Caloenas.*
Acrocephalus.	*Buchanga.*	*Calornis.*
Aegithina.	*Butastur.*	*Cerchneis.*
Alauda.	*Cacatua.*	*Chalcophaps.*
Alseonax.	*Cacomantis.*	*Chalcostetha.*
Anthracoceros.	*Callacops.*	*Chimarrhornis.*
Anuropsis.	*Calliope.*	*Chlorura.*

LIST B—*Continued.*

Coccystes.
Columba.
Corone.
Copsychus.
Cotile.
Dasycrotopha.
Dasylophus.
Dendrobiastes.
Dryococcyx.
Elanus.
Eurystomus.
Excalfactoria.
Gallus.
Geopelia.
Gerygone.
Gymnolaemus.
Haliastur.
Haliaetus.
Harpactes.
Hemilophus.
Hypsipetes.
Lepidogrammus.
Limonidromus.
Lophotriorchis.
Loxia.
Luscinioia.
Macropteryx.
Mainatus.
Megapodius.
Micropus.
Mirafra.
Mixornis.
Monticola.
Muscicapa.
Myristicivora.
Passer.
Pernis.
Phyllergates.
Piprisoma.
Polioaetus.
Poliolophus.
Polyplectron.
Pratincola.
Pseudotharrhaleus.
Pyrrhula.
Sarcops.
Strix.
Sturnia.
Syrnium.
Terpsiphone.
Tiga.
Treron.
Turdinus.
Uroloncha.

On comparison with Steere's List B it will be noted that although the number of genera remains the same, numerous changes have been made in the list. Recent work has made it necessary to add a number of genera, and, on the other hand, I have excluded *Accipiter*, *Alcedo*, *Batrachostomus*, *Bubo*, *Chaetura*, *Carpophaga* (*Carpophaga*, *Hemiphaga* and *Ptilocolpa* of Steere), *Chalcococcyx*, *Columba*, (*Ianthoenas* Steere), *Calicicapa*, *Cryptolopha* (*Abrornis* and *Cryptolopha* Steere), *Geocichla*, *Hierococcyx*, *Lalage* (*Lalage* and *Pseudolalage* Steere), *Merula*, *Munia* (*Munia* and *Padda* Steere), *Rhipidura*, *Stoparola*, and *Xanthopygia*, because each of these eighteen genera has been shown to have more than one species in the islands. I do not consider it necessary to go into the details of the evidence which justifies these changes. It is based on records which Steere overlooked, or which have been made since his paper was written. Reference to the general distribution list will show whether it stands upon the authority of Bourns and myself alone, or upon our authority supported by that of others, or upon that of others alone. I will take this opportunity, however, to reiterate the statement that with very few exceptions no species has been included in the distribution list for which definite locality and collector can not be assigned.

Anticipating to some extent the likelihood of important changes in this table, Steere has said "it is probable that a few genera of this list, among them *Scops*, *Batrachostomus*, and *Megapodius*, will be found to have more than one species in the islands. In this case they will fall into List C (i. e., the list of genera distributed in strict conformity with his law), and will in no sense weaken the conclusions of this paper." It is difficult to see how one could safely attempt to foretell into what list the discovery of additional species of these genera would bring them. As a matter of fact, some of the genera removed from this list

because represented by more than one species in the archipelago fall into Steere's List C, and others decidedly do not.

The revised List B contains a somewhat miscellaneous aggregation of forms. Some of the genera are represented by species with wide range outside of the Philippines, others by species which range widely within the group, but extend little if at all beyond its confines, while a few genera are represented by species which are confined to a single island or small group of islands.

What bearing have the genera included in this list on the question in hand? Steere has unhesitatingly assumed that they all afford confirmations of his law, but I am unable to follow him in this. Where genera happen to have but a single species in the Philippines, but have additional species in other countries, with their ranges overlapping, they manifestly can not be held to afford confirmation of the law. On the other hand, the evidence afforded by the forms peculiar to the Philippines is by no means in every case unequivocal. The presence of but single species of the peculiar genera *Dasylophus* and *Lepidogrammus* in Luzon and the neighboring small islands, for instance, can hardly be explained as due to their being limited by geographical barriers to an area so small and little diversified as to prevent the formation of additional species, for in this same area we find six species of *Dicaeum* and five of *Cinnyris*, while six genera are represented by four species each, eleven by three, and no less than twenty-one by two each. In the case of genera like *Dasylophus* and *Lepidogrammus*, then, I believe that the explanation of the occurrence of but a single species is to be sought in the organisms themselves. It may be that they are generalized forms, capable of existing under a variety of conditions, and hence comparatively independent of their environment

But, apart from their miscellaneous character, there is another reason for excluding the species of this list from further consideration. If a genus is represented by but a single species in a group of islands, it manifestly can not have more than one species on any island of the group, hence can afford no evidence on the question as to whether or not two or more species belonging to the same genus or section of a genus may exist in the same place.

I follow Steere in excluding from consideration genera some or all the species of which are migratory, and under this head I place the following:

List A.

Anthus.	*Merula.*	*Phylloscopus.*
Cuculus.	*Motacilla.*	*Xanthopygia.*
Hemichelidon.	*Pandion.*	
Locustella.	*Pericrocotus.*	

Lanius I exclude from this list, believing that all the species recorded from the Philippines are resident there.

This brings us to Steere's List C, or the list of genera with two or more species which have but one species in a place. Of the genera

placed here by Steere, *Caprimulgus*, *Falco*, *Phillentoma*, *Prioniturus*, *Setaria* (*Rhinomyias* of my lists), and *Siphia* must be excluded, *because each has been shown to have more than one species in one or more of the islands.*

Actenoides I unite with *Halcyon*, *Centrococcyx* with *Centropus*, *Pseudolalage* with *Lalage*, *Broderipus* with *Oriolus*, and *Erythropitta* with *Pitta*.

As already indicated, I exclude *Pericrocotus*, since *P. cinereus* is a winter migrant; but if included at all the genus must be removed to the list of genera with two or more species in a place, as the range of *P. cinereus* overlaps that of *P. igneus* in Palawan, and that of *P. novus* in Luzon.

Recent work has made it necessary to add several genera to List C. With these additions, after making the changes above mentioned, the list will include 41 genera, with 129 species.

In view of the importance of the forms included in this list and the one which follows it, it seems to me advisable to arrange them in tabulated form so as to show not only the exact distribution of each genus in the archipelago, so far as at present known, but the number of its species in each island as well. By this method of treatment certain facts are brought out which would be likely to escape attention were we to consider only total numbers of genera and species, without examining their distribution in detail.

Genera which would fall under Steere's List C, then, I give in Table A. A glance at this table will show that 41 genera, with 129 species, are, so far as we at present know, distributed in accordance with Steere's law.

In his next list (List D) Steere includes 17 genera, with 74 species, and although he admits that in each case two or more species have been found to inhabit one or more of the islands, he holds that the classification is in reality at fault and that the genera should be further subdivided.

It would, perhaps, be not unreasonable to expect a somewhat detailed discussion of the genera in question, with reasons why each should be further subdivided, but he contents himself with the very general statement that "the species thus found together, with the same generic name, differ greatly in size or coloring or other structures and belong to different natural sections or subgenera."

He does attempt to show that where representatives of two or more of these subgenera inhabit an island it is under distinct conditions. My own observations are at variance with his in regard to so many of these species that it seems to me advisable to discuss each of the examples which he has instanced.

He first mentions *Merops bicolor* and *M. philippinus*, which he admits probably exist together in every island of the group. The former species he says is social, hundreds sometimes feeding together at a height of fifty to a hundred or more feet from the ground. He adds that *M.*

philippinus is solitary in habit, feeding near the ground in open country. Its food he states consists of wasps and dragon flies, so far as observed, whereas *M. bicolor* appears to be limited closely to honeybees.

I have repeatedly seen *M. philippinus* feeding in flocks upon honeybees, frequently in company with *M. bicolor*. I have also met with *M. bicolor* feeding singly or in pairs near the ground in open country. The matter is a very simple one. Both species often feed singly, but a swarm of bees is apt to draw a flock of bee birds.

It is remarkable that Steere should dismiss the genus *Cyx* with five lines, especially in view of the fact that he himself described two species of the blue woodland type from Basilan. If his theory were correct, ought he not to have placed these two species in different subgenera, and shown the distinct conditions under which they existed? Bourns and I have shown by a large series of specimens that in reality the types of these supposed species were representatives of one form which displays an unusually large amount of individual variation. This form, however, does exist in Mindanao and Basilan together with *C. mindanensis*, a little red woodland species. The two species are found side by side in the same thickets, their habits are seemingly identical, and a careful examination of the stomachs of a large series of specimens has failed to show any differences in their food.

The blue riparian forms formerly classed in this genus have been shown by Grant to belong to the genus *Alcyone*. Steere is right in saying that they are invariably found along streams; but if he recognizes an ally of *C. melanura* in *C. cnerythra*, his statement that the former species and its allies are always found away from streams and in the forest is certainly incorrect.

Speaking of *Halcyon gularis*, *H. coromanda*, and *H. chloris*, he says that none of them frequent the water, "*H. gularis* being found in open plains, feeding from the ground, or perched in low trees; *H. coromanda* in low, thick undergrowth in forests, and *H. chloris* quite generally near the sea beach, and often in open cocoa groves about the coast villages."

It is my observation that every one of these species frequents the water at times. I have never seen *H. gularis* so abundant as over the waters of Lake Naujan in Mindoro, and it is commonly met with along the banks of fresh-water streams, as is *H. chloris*. The latter species is especially abundant about tide water, in mangrove swamps. I have twice shot *H. coromanda* over water in mangrove swamps, but nearly all our specimens were obtained in the forest, *along fresh-water streams*. In Sibuyan two specimens were obtained in my own yard, where they had come to feed on the bodies of land snails which were thrown out as we cleaned the shells. These birds were far away from both forest and water.

I am unable to agree with the statement that *Osmotreron vernans* feeds from bushes or on the ground, as distinguished from *O. axillaris*, which feeds from trees. Both species certainly feed together in fruit trees, for

I have more than once killed individuals of both at a single shot, in trees of considerable height.

Apropos of *Megalurus palustris* and *M. ruficeps*, the ranges of the two species overlap not in Marinduque alone, but in Mindoro, Luzon, and Samar. I am unable to agree with Steere's statement that there is a sharp distinction of habitat here, *M. ruficeps* being found in waste places inland, which had grown up to high, coarse grass, while *M. palustris* was found close along the beach in open grassy places. The two species are certainly to be found side by side in the same fields, although *M. palustris* is the bolder of the two, and hence more likely to be collected.

In estimating the value of observations on habits the "personal equation" must, of course, be taken into account. I can only say that the above statements are based on nearly three years and a half of actual field work in the Philippines, and that I believe they will be found to be correct so far as they go.

In speaking of the general distribution of the genera represented by two or more species in one or more of the islands, Steere states that "whenever the birds of the two sections of one of the genera named above differ greatly in size, the species of the section of larger longer-winged birds will be more widely distributed than the smaller birds of the other." His first illustration of this rule, *Ninox lugubris*, is certainly well chosen. His second, *Phabotreron amethystina*, is unfortunate. He says that it apparently extends over the areas of the five smaller species. In reality it is confined to the eastern Philippines (Luzon to Mindanao), and its place is occupied elsewhere by *P. macrolipectus*, *P. frontalis*, *P. cinereiceps*, and *P. brunneiceps*, species which had not been described at the time he wrote.

Dicaeum pygmaeum is the most widely distributed Philippine representative of its genus, overlapping the ranges of four other species, yet is the smallest of the Philippine Dicaeidae.

I conclude, therefore, that the rule of distribution above quoted does not invariably hold, and that other factors than size and length of wing play a part in determining whether the range of a species shall be wide or restricted.

Steere's next and final list (List E) includes five genera with ten species, in which two species of the same genus were found existing together in the same islands, these not appearing to him to differ enough to warrant placing them in different sections of the genus. In this list he placed *Melanopitta* (*Pitta*), *Criniger*, *Megalurus*, *Cisticola*, and *Tanygnathus*, each of these genera being credited with two species.

I find it difficult to understand why, having swallowed the camel, he should have difficulty with the tail. The differences between the two species of *Pitta* with which he begins this list are very decided, and if *Dicaeum everetti* and *D. hypoleucum* are to be placed in List D and referred to different subgenera, why not these two species also? *Crini-*

ger frater and *C. palawanensis*, of List E, are certainly quite as unlike as are *Orthotomus frontalis* and *O. cinereiceps*, of List D. *Megalurus palustris* and *M. ruficeps* again seem to me to differ more structurally than do *Merops philippinus* and *M. bicolor*, yet he would leave the former genus undivided and separate the latter, while *Tanygnathus*, of List E, which is represented in the Philippines by three species, might quite as well be divided into subgenera as might *Halcyon* or *Collocalia*, of List D.

In short, if we can accept Steere's List D, I see no reason for not including in it the genera referred by him to List E. This would simplify matters by bringing *all* resident Philippine land birds under his law.

In disposing of the genera which would fall under Steere's Lists D and E, I shall take the classification as the best authorities have left it, and shall unite them under a single distribution table showing the number of species of each genus for every island where it is represented. This table I shall call Table B.

A comparison of Tables A and B will show that, if we accept the classification as it stands, 41 genera, with 129 species, make for Steere's law, and 55 genera, with 264 species, against it. Admitting, as I am quite ready to do, that further subdivision of several of the genera of Table B is advisable and will, doubtless, be made in time, it would, in my judgment, be preposterous to maintain that such division was necessary wherever the ranges of two species of a genus happen to overlap.

To illustrate. Whether or not we admit that *Broderipus* should be included under *Oriolus*, no one will deny that the habits of *O.* (*Broderipus*) *chinensis* on the one hand and those of various representatives of the *O. steerii* type on the other are so distinct that competition between these forms would be almost out of the question. Their occurrence side by side, then, is no argument against the spirit of Steere's law, although it may infringe the letter. But what of the occurrence of *O. albiloris* and *O. isabellae*, both of the *O. steerii* type, in Luzon?

Prioniturus has always been one of Steere's favorite genera for illustrating his law, but Grant has shown that *P. luconensis*, *P. discurus*, and *P. montanus* all occur in Luzon. Admitting that the last mentioned species may properly be assigned to a separate section of the genus, what shall we do with the other two?

Shall we divide *Cinnyris* into five sections to accommodate its Luzon representatives, add another for *C. guimarasensis* in the central Philippines, and still another for *C. juliae* in the south?

On the strength of what shall we place *Iole rufigularis* and *Iole philippinensis* or the different species of *Zosterops* in different subgenera?

Finally, is it by any means certain that competition may not be quite as keen between birds that are quite differently colored as between those that are very similar in this particular? Take the Phil-

ippine Dicaeidae for instance; most of the larger islands have a representative of the *D. dorsale* type, and one of the *D. haematostictum* type. The prevailing colors of the former group of species are slate blue, orange, and scarlet; those of the latter black, white, and red, or scarlet, yet nothing is commoner than to find representatives of the two groups feeding side by side from the same flowers.

With six representatives in Luzon, five in Samar, four in Leyte, three each in Mindoro, Masbate, Negros, Mindanao, Basilan, and Sulu, and two in Siquijor, Cebu, Guimaras, Panay, Sibuyan, Catanduanes, Dinagat, and Tawi Tawi, the genus *Dicaeum* would be somewhat disfigured if Steere's law were to be strictly enforced upon it.

Numerous other instances of the singular conclusions into which this law would lead us might be given, but I think that those already mentioned will suffice.

In formulating his law, Steere offers the following as an alternative for the statement of it already given: "No two species near enough alike structurally to be adapted to the same conditions will occupy the same area." This statement seems to me to be self-contradictory. Individuals of any given species are certainly adapted structurally to about the same conditions, yet they manage to exist together. If two species structurally adapted to the same conditions were brought into competition in a given area, each would continue to exist in the area in question in numbers proportionate to the number of each at the time competition began.

I find no satisfactory line of argument in Steere's paper leading up to his conclusion that isolation is the first and necessary step in the formation of species. This conclusion necessarily raises the whole question of the way in which environment acts. No one will deny that it has its effect, but does it act directly, stimulating the production of variations, or indirectly by favoring some of the variations spontaneously presented to it?

Manifestly there can be no progressive development without variation, and in saying that isolation is the first and necessary step in species formation Steere commits himself to the former view. His position does not differ essentially from that of Moritz Wagner and his followers, nor can I see that he has added anything new to the evidence bearing on the subject. The mere fact that there are numerous geographical races of birds in the Philippines does not afford an explanation of the part played by geographical isolation in producing them.

FACTORS IN THE ORIGIN AND DISTRIBUTION OF THE GENERA AND SPECIES OF RESIDENT PHILIPPINE LAND BIRDS.

I have thought it worth while to examine with a good deal of care the facts brought out in Tables A and B, in order to ascertain whether they afford foundation for any general principles of species formation and distribution, and have first endeavored to ascertain whether there

is any relationship between the size of an island and the number of species of a genus likely to be found upon it.

A glance at Table B will at once show that the actual number of genera with two or more species in an island is far higher in Luzon, Mindanao, Palawan, and Samar than in the smaller islands of the archipelago, but it will be objected that more species of all kinds, including those distributed according to Steere's law, are known from these islands. Manifestly, then, the error arising from the fact that the birds of some islands are much better known than those of others must be eliminated as far as possible if we are to arrive at any conclusive results.

I have first compared the possible with the actual exceptions to Steere's law in each island on the basis of our actual knowledge.

If a genus which anywhere in the archipelago has more than one species in a place occurs in a given island, we have the possibility of its being represented there by more than one species. If, then, we take all the genera of Table B which occur in any given island, compare the number represented by single species with that having two or more species, and reduce our results to percentages, we shall have a tolerably satisfactory basis for comparing the relative tendencies toward differentiation of genera into several species in islands of different size, and shall have eliminated as far as practicable the error arising from the incompleteness of our knowledge in regard to many of the islands, for in each case the comparison is between the total genera known from the place in question and the factors which go to make up that total.

The percentages of possible to actual exceptions to Steere's law obtained by this method are given as one of the footings of Table B, but in order that the facts brought out may be more readily grasped I have embodied them in a curve, which I shall refer to as Curve 1. It is constructed as follows: The percentage of genera represented by two or more species in an island is in each case indicated by units arranged in vertical series, 1 unit being allowed for 1 per cent. The relative areas of the several islands are shown by units arranged horizontally. In order to keep the curve within reasonable limits, and still make plain its relationships, I have found it necessary to vary the scale used in indicating the areas of islands.

In comparing very small islands like Sibutu and Lapac with Mindanao and Luzon it is obvious that the first part of the curve must be expanded and the last contracted or we should lose the relationships at the beginning, and the curve would stretch out at its end to inconvenient length. Up to 900 square kilometers, therefore, I have made 1 unit correspond to 10 square kilometers. From 900 to 14,900, 1 unit corresponds to 100 square kilometers, while from 14,900 to 114,900 I have allowed 1 unit to each thousand square kilometers.

The relative sizes of the islands determine their positions in the base line, while a dot at the proper height over each shows the percentage of genera with two or more species found in it. If the dots thus

located are joined, we have a curve which brings out the relationship between these percentages and areas.

Upon examining the curve thus constructed it becomes immediately evident that there is a general relationship between the size of the islands, and the percentage of genera represented by two or more species, for the curve begins at zero for the smallest islands, and its general trend is upward until it finally reaches the 80 per cent mark in the largest island—Luzon. Numerous irregularities are noticeable, however, and the more conspicuous of these are of decided interest.

It is self-evident that only a general correspondence between area and amount of differentiation could be expected. Size is no doubt directly important, since room is afforded for numerous individuals of the species represented, and the probability of the occurrence of opportune and important individual variations is correspondingly increased: but for our present purpose I believe that the size of islands is chiefly important in that it serves as a rough index of the probable diversity of conditions existing upon them. The occurrence of extensive highlands, of undisturbed forest and of fresh-water lakes and streams, as well as of extensive open lowlands, must be taken into consideration if we are to get to the bottom of the matter. Were it possible to give each of these factors its due value in constructing our curve, and to introduce, as well, another important factor, namely, the completeness and length of duration of separation from neighboring islands, I believe that the irregularities would disappear.

For instance, Bohol, though an island of 850 square kilometers, has no highlands and its forest has seemingly been wiped out. The very low level of the curve at this point, then, finds its explanation in a uniformity of conditions unfavorable to the differentiation of numerous species, or to their continued existence after they have become differentiated.

It will be noted that the curve is much broken at its origin, although it runs low on the whole. This irregularity is largely due to our scanty knowledge of the islands in question. For Lapac our conclusions are drawn from but two genera, for Fuga from four, for Cagayan Sulu from five, and for Camiguin from three. Manifestly, in dealing with such small numbers the addition or subtraction of a single genus even makes a great variation in the percentage. No collections approaching completeness have ever been made on these islands, and the irregularity of the curve is exactly what would be expected from the scanty haphazard collecting on which it is based.

We are indebted to Mr. Everett for nearly all that we know of Sibutu, and he tells us little about its surface. It would be interesting to know whether the conspicuous rise in the curve for this island is correlated with a comparatively great diversity of conditions. Tawi Tawi, at any rate, is well wooded and well watered; the curve rises. Siquijor is not well wooded nor well watered, and is of comparatively recent origin; the curve falls. The surfaces of Guimaras and Sulu are diversified, and

both islands are fairly well known: the curve rises for these islands. Marinduque marks the lowest remaining point. The island is known only from the collections of the Steere Expedition, and in making them we had to tramp miles from the village where we had headquarters in order to get into scattering forest hardly worthy of the name.

It will be noted that the latter part of our curve, where we are dealing with large islands, each of which has some virgin forest remaining, is comparatively regular.

Attention should be called to another important fact. By reference to the footings of Table B it will be seen that not only does the number of genera showing two or more species reach its maximum in the largest islands, but the number of species into which genera are differentiated reaches its maximum as well. Luzon leads with six species of *Dicaeum* and five of *Cinnyris*, while we have six genera with four species each, and eleven with three. Mindanao follows, having one genus with five species and eight with three. I know of no simple means by which this factor could be introduced into the curve, but its significance should not be lost sight of.

It seems to me that the facts above stated justify the conclusion that in the Philippines the larger the island and the greater the diversity of its surface, the larger the percentage of genera represented by more than one species, and the larger the average number of species into which they are differentiated.

It may be objected that we also find the largest number of genera distributed in accordance with Steere's law, i. e., with but one species in a place, in the largest islands. This is true, Mindanao leading with 32, followed by Luzon with 28, Samar with 27, and so on. It should be remembered, however, that we are dealing here with relative, not absolute quantities, and the real question is not whether the absolute number of confirmations of Steere's law is higher for these islands, but whether it is proportionately higher. It can be readily shown to be proportionately lower.

In constructing Curve II, to illustrate this point, I have used the same abscissa and ordinate as for Curve I, vertical units indicating percentages, and horizontal units areas. In computing percentages for each island I have taken the total number of confirmations of Steere's law from Table A, and added it to the total number of exceptions shown in Table B. This gives the total number of genera affording evidence in each case, and it is an easy matter to ascertain what percentage of this total is distributed in the one way, and what in the other.

In Curve II, as in the curves that follow it, a solid line is used to represent confirmations of Steere's law, and a broken line to indicate exceptions to it.

For reasons already stated the curve is irregular for the smaller and less well-known islands, but its general features are apparent even here. The solid line shows a constant tendency to return to the 100 per cent mark, the broken line to fall to zero.

The islands from which the smallest number of genera is known, then, afford the strongest confirmation of Steere's law.

As we pass to the larger and better known islands, the broken line takes permanent leave of the zero level, and the solid line of the 100 per cent mark. It will be noted, however, that on the average the solid line keeps well above the 50 per cent mark. The first thing that calls for special attention is its sudden drop to 27 per cent for Siquijor, and the corresponding rise in the broken line. Reference to the tables will show that this result is due not so much to a larger number of exceptions to Steere's law from Table B, as to an unusually small number of confirmations (only three) from Table A.

I have already stated my reasons for believing that Siquijor is an island of very recent origin, and has not been connected with any of the adjacent islands since it received its present bird fauna. I believe it can be shown that the birds distributed according to Steere's law are, as a rule, possessed of comparatively weak power of flight, and this probably accounts for their not having reached Siquijor in larger numbers. The divergence of the two lines for Marinduque, and their approximation for Bohol find their explanation in the facts already stated in regard to these islands. Again, it will be noted that the curve becomes more regular as we pass to the larger and better known islands, the broken line steadily rising as the solid one falls.

The evidence furnished by Curve II, then, confirms that obtained from Curve I. On the strength of it we may make the statement that the larger and more diversified the island, the larger will be the average number of species into which the genera of Table D are differentiated, and the larger will be the percentage of genera represented by two or more species as compared with those represented by but a single species.

I have shown that a majority both of genera and species are distributed in opposition to Steere's law. How then are we to explain the fact that the solid line in Curve II, indicating the percentage of genera in each island distributed according to this law, is well above the 50 per cent mark?

The answer to this question is found in part in the fact that two species of a genus may, and not infrequently do, have ranges that are distinct for the most part, but overlap along their line of contact, so that the species in question afford exceptions to Steere's law in only a part of the islands in which they occur. An additional and very important reason for this apparent contradiction will readily suggest itself.

To find ten exceptions to Steere's law we must collect at the very least twenty species of birds, while ten species may suffice to afford ten confirmations of it. If, then, genera distributed in the two ways were equally abundant upon an island, we should at first find at least two confirmations of Steere's law for every exception. Really, however,

the percentage of exceptions found would at first be very much smaller than this, from the fact that to afford evidence the species must be collected at least in pairs, i. e., two to a genus.

To take a very simple illustration, suppose that three figure ones were shaken up in a hat, together with two twos, two threes, and two fours, and one were then to draw out the figures at random, placing the ones in one pile and the pairs of twos, threes, and fours in another: at what rate would the two piles grow?

On the first draw there would be three chances in nine of getting a one, but only two in nine of getting a two, three, or four, and no chance whatever of getting a pair of either of the last three numerals. On the second draw there would be three chances in eight of getting a one, but only two in nine plus two in eight divided by two (the number in a pair) multiplied by three (the number of pairs), or seventeen in two hundred and sixteen, of getting a pair. Three in eight are equivalent to eighty-one in two hundred and sixteen, and the chances of getting a one on the second draw would be to those of getting a pair of twos, threes, or fours as eighty-one is to seventeen. As the drawing continued, the chances of getting a pair would improve each time, but would equal those of getting a one only at the very close of the drawing.

Returning now to our birds, the matter may be reduced to a formula. We may, for convenience, divide them into genera with one species in a place, and those with two species in a place, for in genera with more than two species in an island the recording of two is enough to establish an exception, while the increased probability of recording two species, arising from the fact that there are more than two to draw from, will be counterbalanced by the fact that three or four species belonging to but one genus constitute but a single exception.

Let a = number of genera with but one species in an island.

Let b = number of genera with two species in an island.

Then $a + 2b$ = whole number of species in the island.

Let z = number of species known.

Were a collector to take up the work at this point his chance of making an addition to the list of genera represented by single species would be $\frac{a}{a+2b-z}$, while his chance of making an addition to the list of genera with two species each would be but $\frac{2}{a+2b-z}$, or $\frac{1}{a+2b-z}$. Since z is the variable factor here, and increases one with every addition of a species, it is evident that as the number of species of birds known from an island approximates the number actually existing there the chances of recording exceptions to Steere's law will steadily increase.

It is not too much to say, then, that as there is probably not a single island all of the resident land birds of which are known the broken line in our curves is everywhere too low; that the error is smallest for those islands that are best known and greatest for those that are least known.

Unfortunately the number of genera recorded from an island is not exactly indicative of the completeness of our knowledge of it, since some islands doubtless have more genera than others. It seems, however, to be the most satisfactory index available, and in Curve III the islands are arranged not according to size, but on the number of genera having two or more species in the Philippines known from each. The number of genera is indicated by units arranged in horizontal series, 4 units being allowed for each genus. On this basis I have compared the percentages of genera distributed in the two ways for each island, reckoning percentages as before.

Irregularities in our curve are not lacking, but the more important of them have already been discussed, and the curve establishes beyond a doubt the fact that Steere's law receives its strongest confirmation in the islands from which the smallest number of genera is at present known, and that as our knowledge increases the percentage of genera represented by a single species steadily falls.

It may be objected that my treatment of this subject has been unfair, in that I have omitted from consideration, in reckoning percentages for Curves II and III, the genera of Table B wherever they happened to be represented by but a single species. It may be said that I ought to consider each instance where a single species of one of these genera is recorded from an island as a confirmation of Steere's law, rather than as a bit of evidence incomplete, and therefore to be ignored.

I might well reply that in view of the heavy chances against the discovery of exceptions to the law, it is no more than fair to leave the genera of Table B out of account in islands where but one species happens to have been recorded, and as a further offset might add that in plotting the curves no more importance has been given to an exception where six species of a genus occur in an island than to one based upon the occurrence of but two. On the whole, then, I believe my treatment has been fair; but in order to test further the general correctness of my results I have constructed two more curves, in which I have given Steere's law the benefit of every doubt, and have counted every case where a genus of Table B is recorded with but one species as a confirmation of it. In Curves IV and V the percentages of *species* distributed in the two ways are shown.

Arranging the islands in order of their size we get Curve IV, which does not differ in any essential particular from those already obtained, and enforces the same conclusion stated in terms of species that Curve II enforces stated in terms of genera. We see that in the smaller islands nearly or quite all the recorded species belong to different gen-

era, but as the islands grow larger it becomes increasingly common to find two or more species of a genus in a place.

Although this curve does not rise quite so high for Luzon as did Curve II, its general level is well up, owing to the fact that due importance is given to the number of species affording exceptions to the law, which has not been done in the other curves.

Perhaps the most conclusive of all the curves is Curve V, where the islands are arranged according to the number of species in Tables A and B recorded from each.

These last two curves make it evident that even when Steere's law is given the benefit of the doubt in every case, which is most illogical, there still remains for all but the very smallest and least known islands a mass of exceptions altogether too formidable to be overlooked; that the percentage of exceptions steadily increases with increase in the number of species recorded, and that finally in the largest and best known islands it is no less than 73 per cent of the whole number of species considered.

It remains to be ascertained whether the genera of Tables A and B group themselves into separate families, or whether we shall find that in the majority of cases some genera of a family are distributed in the one way, others in the other.

In Curve VI, I have endeavored to bring out the facts. Families are arranged in horizontal series, space being given to each proportionate to the number of genera that it includes, 4 units being allowed to each genus. It will be seen that in fourteen families there is not a single genus of resident land birds with but one species in an island. Seven more families have less than half their genera distributed according to Steere's law; three have their genera equally divided as regards the method of their distribution; four have more than 50 per cent distributed according to the law, while eight have all their species so distributed.

With few exceptions, the species included in these eight families are possessed of comparatively weak power of flight, hence are unable to surmount geographical barriers of any importance. I do not doubt that they are in many instances to be regarded as geographical races, and that isolation has had much to do with bringing them into existence, but I feel indisposed to make the same admission for all the species belonging to the fourteen families which do not offer a single confirmation of Steere's law.

I believe, then, that in formulating his law Steere has given altogether too much importance to a really important factor in the development of species. He has assigned undue prominence to geographical barriers, especially sea channels, and has not given sufficient consideration to the fact that within the confines of the larger islands, especially when they are mountainous and well wooded, there is abundant room for life zones which may be quite as sharply defined as those marked out by salt water.

My own conclusions in regard to the whole matter are as follows:

1. There are in the Philippines a number of closely allied species of birds, each of which has a definite range that in many instances at least does not overlap the range of any other species of the same genus. The general correspondence between the ranges of these species and the positions of geographical barriers to their free migration lends probability to the conclusion that we are here dealing with a case of cause and effect, especially when we remember the fact that the phenomenon is not an isolated one, but has been observed in the Galapagos and other island groups.[1]

2. On the other hand, cases where two or more closely allied species of the same genus occur within the limits of a single island are too numerous to be overlooked. While it does not necessarily follow from the fact that two species occupy the same island that they occupy the same life zone, there are enough well ascertained cases where two allied species do occur side by side to effectually negative Steere's conclusion that the genus is represented by but a single species in a place.

3. We are more likely to find genera represented by several species in large islands with diversified surfaces than in small islands in which comparatively uniform conditions prevail, and in islands that are well known than in those that are little known.

4. Among the facts at our disposal there is nothing to justify the statement that isolation is the first and necessary factor in species formation, since we have no proof that environment is the direct cause of variation, without which there can be no development.

5. In studying island avifaunae it should be remembered that geographical barriers, in the ordinary sense, are not the only barriers which are effective in bringing about localization of birds. Temperature, distribution of food supply, direction of prevailing winds, character and duration of seasons, and especially the nature and distribution of enemies are of importance in limiting the ranges of species, and must be taken into consideration before we can arrive at any final conclusions.

6. If two closely allied species were thrown together in an island one of three things would happen. They would continue to live together, preserving their relative numbers, or they would fuse with each other, forming a hybrid race, or one species would tend to exterminate the other.

7. I do not at present know of any positive evidence in favor of Steere's theory that they would fuse. Similarity in coloring, or in the food, would by no means serve to offset the well-known tendency to sterility between different species, and especially among the hybrid

[1] See Wallace's "Island Life." Also Moritz Wagner, Die Darwinische Theorie und das Migrationsgesetz der Organismen., Leipzic, 1868; Baur, Ein Besuch der Galapagos-Inseln. Biol. Centralbl., XII, p. 221, 1892; Ridgway, Birds of the Galapagos Archipelago., Proc. U. S. Nat. Mus., XIX, p. 459, 1897.

offspring of different species, in balancing the probabilities in such a case.

8. The actual result would probably depend, then, on the relative completeness of the adaptation of the two species to the common environment under which they were placed. If equally well adapted to their surroundings, both would continue to exist. If not, one species would tend to exterminate the other.

POSSIBILITIES OF FUTURE ORNITHOLOGICAL WORK IN THE PHILIPPINES.

Before we gain much additional light on the value of the several factors in the origin and distribution of the genera and species of resident Philippine land birds, work of a very different character from most of that which has as yet been attempted must be carried on.

Conclusive proof of the result of bringing together two closely allied species might be obtained by introducing two of the species of *Loriculus* into Palawan or the Calamianes islands, where the genus is at present lacking, and noting the result. Would both forms hold their own, would they fuse, or would one tend to exterminate the other? These questions have no little theoretical interest, and they are entirely capable of practical solution.

Individuals of a single species of some genus with a marked tendency to develop local forms, such as *Chrysocolaptes*, *Iyngipicus*, or *Penelopides*, might be introduced into Siquijor or some other similarly isolated island, and their offspring watched, to see if a new species would in time develop, under the influence of changed environment. True, the experimenter would probably not live to see the result of his work, but future generations of ornithologists might be indebted to him.

Within the limits of an ordinary lifetime, however, one might make a detailed examination of the facts of individual variation in those species which show a marked tendency to develop local forms as compared with those that seem to lack such a tendency. He might also learn an immense amount in regard to the habits of birds, their foods, and especially their relationships with each other, with other organisms, in short, with their environment in general. We know very little about this subject at present, and without information bearing on it we can not arrive at satisfactory conclusions.

To take a single illustration, *Pycnonotus goiavier* is almost certainly lacking in Siquijor. Why should this commonest of Philippine birds not occur there? Certainly not because it could not have reached the island. Apparently not from lack of a supply of suitable food. Probably from the presence of some enemy, at present entirely unknown to us.

I am led by the results of our work in Siquijor, Tablas, and Sibuyan

to believe that a careful study of the smaller and more isolated islands would be productive of important results.

The study of the relationship between species formation and environment is in its infancy. Much is to be hoped from it, and it is comforting to reflect that sooner or later the supply of "new species" will be exhausted, and ornithologists will have time to learn more about old ones.

Were some competent naturalist to go to the Philippines with an abundance of time before him and sufficient funds behind him to allow of his carrying on his work upon a broad scale; were he free from the necessity of turning out about so many bird skins a month, and of discovering his quota of new species each year, he might in due time make a contribution of far-reaching importance to scientific ornithology, and to our knowledge of island life in general.

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TABLE A.

Names of genera	Number of species.	Cagayan Sulu.	Cuyo.	Balabac.	Palawan.	Calamianes.	Bohol.	Siquijor.
1. Accipiter	12				1			
2. Alcyone	14							
3. Artamides	7			1	1	1		
4. Baza	2				1			
5. Brachypteryx	3							
6. Bolbopsittacus	3							
7. Bubo	12							
8. Chactura	3				1			
9. Chalcococcyx	2				1			
10. Chibia	3			1	1	1		
11. Chrysocolaptes	5			1	1	1		
12. Chloropsis	5			1	1	1		
13. Cittocincla	5			1	1	1		
14. Corvus	2			1	1	1		
15. Cranorrhinus	2							
16. Cyanomyias	2							
17. Dendrophila	3			1	1			
18. Edoliisoma	5							
19. Endrepanis	2							
20. Dicrurus	3							
21. Hydrocorax	3							
22. Irena	4			1	1	1		
23. Iyngipicus	6							
24. Loriculus	8						1	1
25. Geocichla	2							
26. Macronus	3							
27. Microstictus	2							
28. Microhierax	2							
29. Mixornis	2	1		1	1			
30. Pelargopsis	2			1	1	1		
31. Phlogoenas	4							
32. Penelopides	6							
33. Ptilocichla	4			1	1			
34. Pycnonotus	2			1	1	1	1	1
35. Sarcophanops	2							
36. Spilornis	3			1	1	1		1
37. Stoparola	2							
38. Surniculus	2			1	1			
39. Thriponax	4				1			
40. Xanthohaema	2							
41. Zocephus	3				1	1		
Total	129	1	0	14	20	11	2	3

TABLE B.

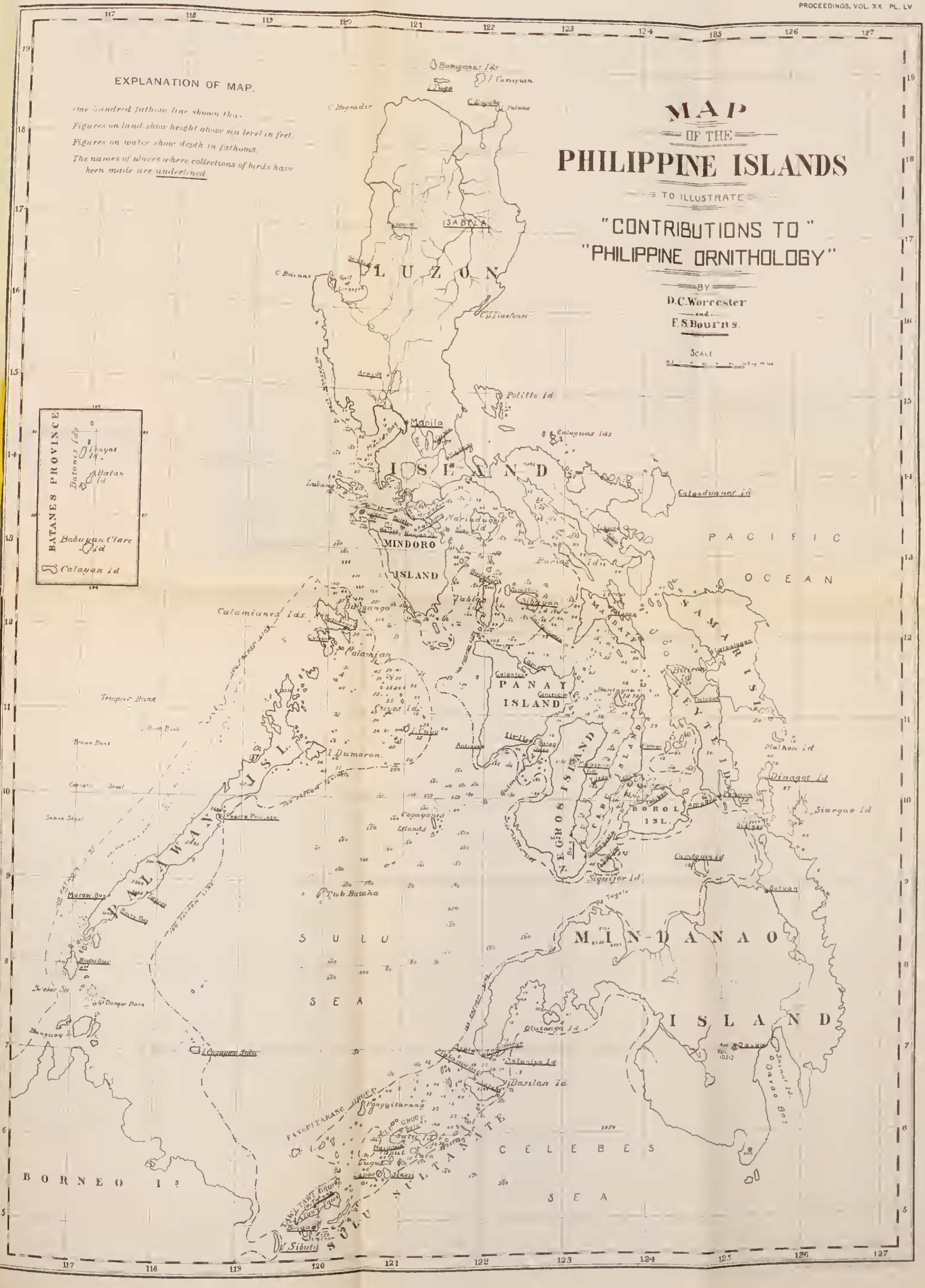
Names of genera.	Number of species.	Cagayan Sulu.	Cuyo.	Balabac.	Palawan.	Calamianes.	Bohol.	Siquijor.
1. Aethopyga	6			1	1	1		
2. Alcedo	2			2	2	2	1	1
3. Anthothreptes	4	1		1	2	2		
4. Arachnothera	3				1			
5. Batrachostomus	5				2			
6. Centropus	7			1	2	1	2	2
7. Caprimulgus	4				3	1		
8. Carpophaga	6	1		1	1	1	1	1
9. Cettia	2							
10. Ceyx	5			1	1	1		1
11. Cinnyris	8			1	2	2	1	2
12. Circus	3				1			
13. Cisticola	2				1	1	1	1
14. Collocalia	7				4	1		1
15. Criniger	2			1	2	1		
16. Cryptolopha	4				1			
17. Dicaeum	18			1	1			2
18. Emberiza	3							
19. Endynamis	2				2			1

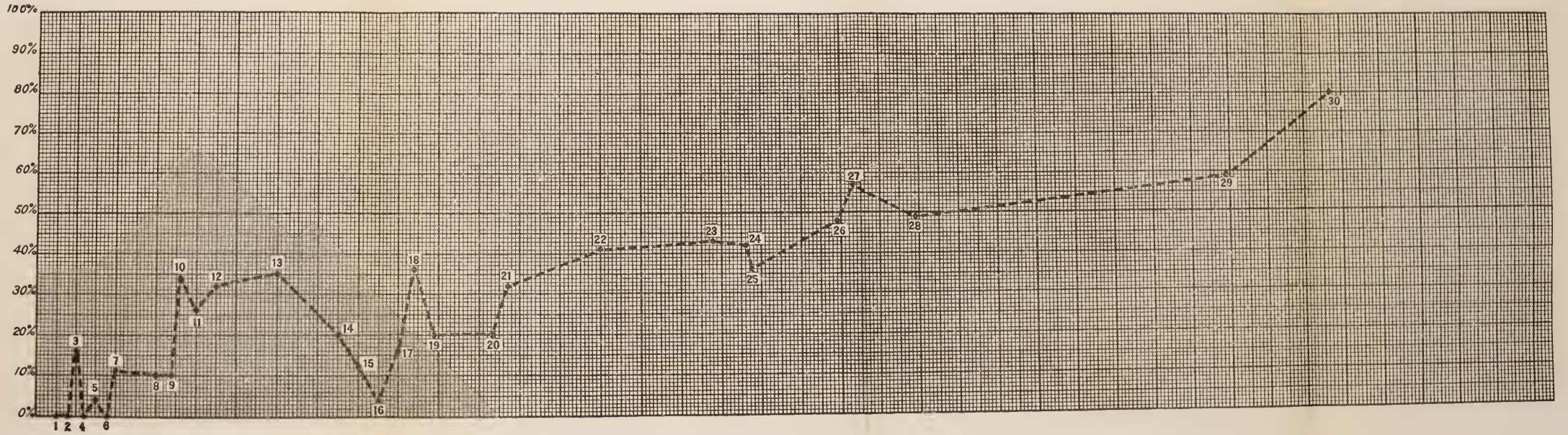
TABLE A.

Cebu.	Masbate.	Negros.	Guimaras.	Panay.	Tablas.	Romblon.	Sibuyan.	Mindoro.	Luzon.	Marinduque.	Catanduanes.	Fuga.	Samar.	Leyte.	Dinagat.	Panaon.	Nipah.	Camiguin.	Bazol.	Sakuijok.	Mindanao.	Basilan.	Sulu.	Lapac.	Siassi.	Tawi Tawi.	Bongao.	Sibutu.	Malanipa.
...	...	1	1	...	...	...	...	1	1	...	...	1	...	1	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...
1	1	1	...	1	...	...	1	1	1	1	...	...	1	1	1	...	...	...	...	...	1	1	...	...	...	...	...	...	...
1	1	1	1	1	1	...	...	1	1	...	...	...	1	1	...	1	1	...	...	...	1	1	1	1	...	1	1	1	...
...	...	...	...	...	...	1	...	...	...	...	...	...	1	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...
...	...	1	...	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	1	...	...	...	1	1	...	1	...	...	...	...	1	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...
...	...	1	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...
1	...	1	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	1	1	...	...
...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	1	1	1	...
...	1	1	1	1	...	...	...	...	1	1	...	...	1	1	...	1	...	...	...	...	1	1	...	...	...	...	...	...	...
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...
1	1	1	...	...	...	...	...	...	1	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	1	...	...	...	...	1	...	...	...	...	1	...	...	1	...	...	...	...	...	...	...	...
...	1	1	1	1	...	...	...	...	...	...	...	...	1	...	1	...	...	...	...	...	1	1	...	...	...	...	...	...	...
1	...	1	1	1	...	...	...	...	1	...	...	...	1	1	...	...	...	...	...	...	1	1	...	...	...	...	...	...	...
1	...	1	1	1	...	...	...	...	...	...	...	...	1	1	...	...	...	...	...	...	1	1	1	...	...	1	1	...	...
1	1	1	1	1	...	...	...	...	1	1	...	...	1	1	...	1	1	...	...	...	1	1	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	1	1	...	...	1	1	...	1	...	...	...	...	1	1	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	...	...	...	...	...	...	1	1	...	...	...	...	...	...	...
1	...	1	1	1	...	...	1	1	1	1	...	...	1	1	...	...	...	...	...	...	1	1	1	...	...	1	1	...	...
1	1	1	1	1	1	1	1	1	1	1	...	...	1	1	1	...	...	...	...	...	1	1	1	...	...	1	1	...	...
...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	1	1	...	...	1	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	1	...	...	...	...	...	1	1	1	...	...	1	1	...	...
...	...	...	...	...	...	...	...	...	...	1	1	...	1	1	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...
1	...	...	...	...	...	...	...	1	1	...	...	...	1	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	1	1	1	1	1	...	1	1	1	...	...	...	1	1	1	...	...	...	...	...	...	1	1	1	...	1	1	1	1
...	...	...	...	...	...	...	...	1	1	...	...	...	1	1	...	...	...	...	...	...	1	1	1	...	...	1	...	...	...
...	1	1	1	1	...	...	...	1	1	1	...	...	1	1	1	...	...	...	...	...	1	1	...	...	...	...	...	...	...
1	1	1	1	1	1	...	...	...	...	...	...	...	1	1	...	1	...	...	...	...	1	1	1	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	...	...	...	1	1	...	...	...	...	...	...	...
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	...	...	...	...	...	...	1	1	1	...	...	1	1	...	...
...	...	1	...	1	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	1	...	...	...	...	...	...	1	...	...	...	1	...	...	...	...	...	...	...	1	1	1	...	...	1	...	...	...
1	1	1	1	...	...	...	...	1	1	...	...	...	1	1	...	...	...	...	...	...	1	1	1	1	..	1	1	...	...
1	1	1	1	...	...	...	...	1	1	...	...	...	1	1	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...
1	...	1	...	1	1	1	1	1	1	1	...	...	...	...	...	...	...	...	...	...	1	1	1	...	...	1	1	...	...
16	12	23	15	16	7	4	7	19	28	12	2	1	27	23	8	6	3	1	0	0	32	24	14	3	0	14	11	3	1

TABLE B.

Cebu.	Masbate.	Negros.	Guimaras.	Panay.	Tablas.	Romblon.	Sibuyan.	Mindoro.	Luzon.	Marinduque.	Catanduanes.	Fuga.	Samar.	Leyte.	Dinagat.	Panaon.	Nipah.	Camiguin.	Bazol.	Sakuijok.	Mindanao.	Basilan.	Sulu.	Lapac.	Siassi.	Tawi Tawi.	Bongao.	Sibutu.	Malanipa.
2	1	1	...	2	1	...	1	1	1	...	...	...	1	...	...	...	...	...	...	...	1	...	1	...	...	1	...	...	...
1	1	1	1	1	1	1	1	1	1	...	1	...	1	1	...	...	...	...	...	...	1	1	2	...	...	2	1	...	...
1	1	1	...	1	1	1	1	...	1	...	...	...	1	...	...	...	...	...	...	1	2	1	1	...	...	1	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	2	2	...	...	...	...	...	...	2	1	...	...	...	...	...	...	...
...	...	...	...	1	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	1	1	...	...	...	...	...	...	...
2	1	2	1	2	1	1	1	3	4	1	1	...	2	3	...	...	1	...	...	...	3	2	3	...	...	1	2	1	...
...	...	...	...	...	...	...	1	1	2	...	1	...	...	...	...	...	...	...	...	...	1	1	...	...	...	...	...	...	...
2	2	3	1	2	1	...	1	4	4	1	1	1	2	2	2	...	...	...	...	...	3	2	2	...	...	2	1	2	...
...	...	...	...	...	...	...	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1	...	1	...	...	1	1	1	1	1	...	...	...	1	1	1	...	...	...	...	...	2	2	1	...	...	2	2	...	...
2	2	3	3	3	2	2	2	2	5	2	2	...	2	2	2	...	1	1	1	...	3	2	2	...	...	2	1	1	...
...	...	1	1	...	...	...	...	2	3	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...	...	...	...	...	...
1	1	1	...	1	1	...	1	1	2	1	...	...	1	...	...	...	...	...	...	...	2	...	1	...	...	...	...	...	...
2	2	3	1	3	...	1	1	2	4	1	...	...	1	1	...	...	...	...	...	...	2	...	...	...	...	...	1	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1	...	2	...	...	...	...	...	1	2	...	...	...	1	1	...	...	...	...	...	...	1	...	1	...	...	1	...	...	...
2	3	3	2	2	1	1	2	3	6	...	2	...	5	4	2	1	...	...	...	...	3	3	3	...	1	2	1	1	...
...	...	...	...	...	...	...	...	...	2	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1	1	1	1	1	1	1	1	1	1	1	...	1	1	1	...	...	...	...	...	...	1	1	1	...	...	1	1	...	...

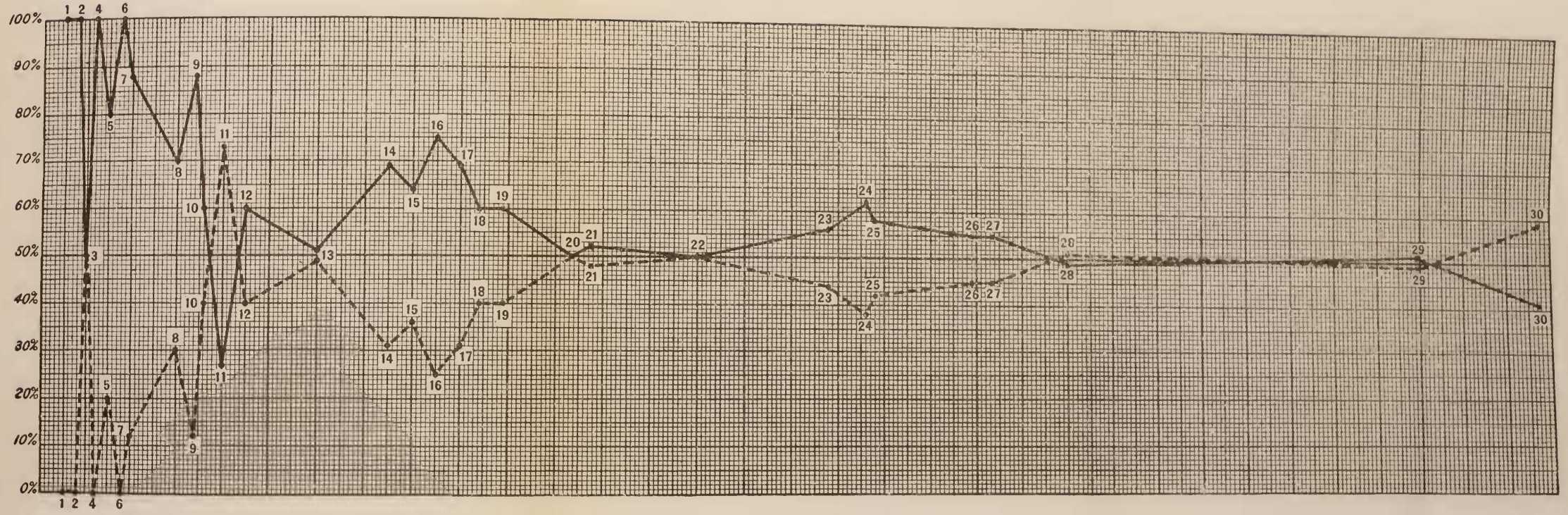

MAP
OF THE
PHILIPPINE ISLANDS
TO ILLUSTRATE
"CONTRIBUTIONS TO"
"PHILIPPINE ORNITHOLOGY"
BY
D.C.Worcester
and
F.S.Bourns.
SCALE
EXPLANATION OF MAP.
Figures on land show height above sea level in feet.
Figures on water show depth in fathoms.
BATANES PROVINCE
LUZON
ISLAND
ISABELA
Manila
MINDORO
ISLAND
PANAY
ISLAND
NEGROS ISLAND
BOHOL
ISL.
SAMAR
LEYTE
MINDANAO
ISLAND
PALAWAN
SULU
SEA
CELEBES
SEA
PACIFIC
OCEAN
BORNEO
Calamianes Ids.
Calanduanes Id
Dinagat Id
Siargao Id
Basilan Id.
Siquijor Id
Cagayanes Islands
Tub Bataha
Polillo Id
Catanduanes Id
Marinduque Id
Sibuyan
Burias Id
Camiguin
Babuyan Claro Id
Calayan Id



CURVE I.

DISTRIBUTION CHART SHOWING WHAT PERCENTAGE OF THE GENERA OF TABLE D KNOWN TO OCCUR IN EACH ISLAND ARE REPRESENTED BY TWO OR MORE SPECIES. THE ISLANDS ARE ARRANGED ACCORDING TO THEIR AREAS.

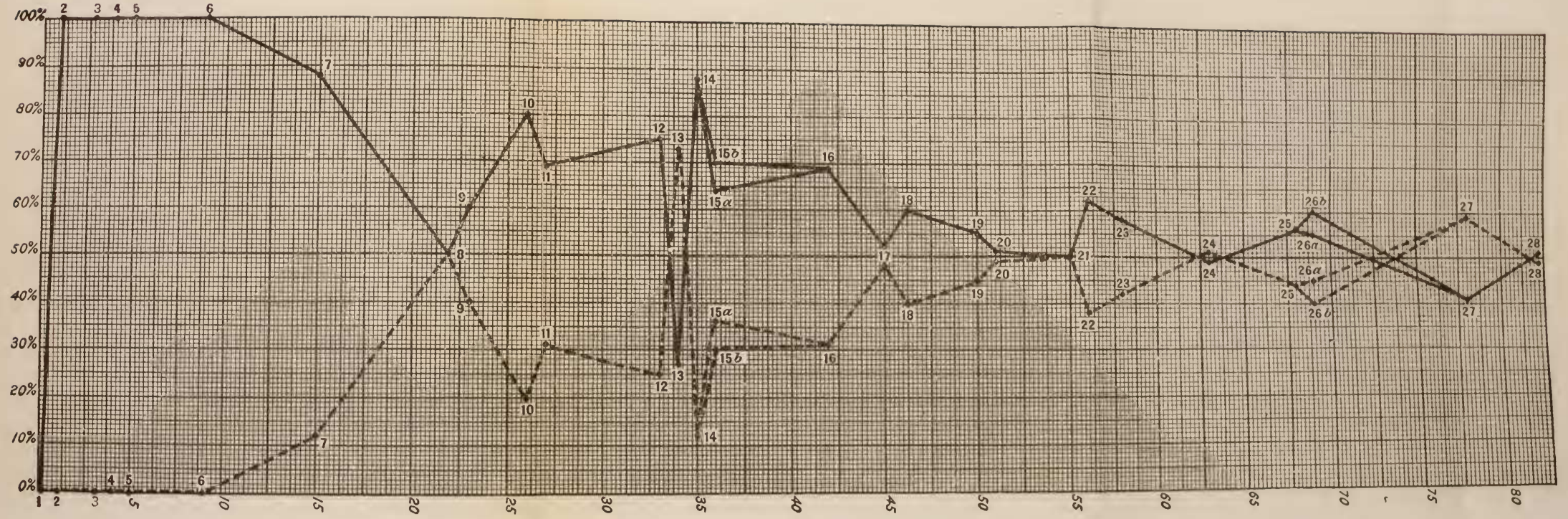
1. Lapac.
2. Fuga.
3. Sibutu.
4. Cagayan Sulu.
5. Romblon.
6. Camiguin.
7. Panaon.
8. Sibuyan.
9. Balabac.
10. Tawi Tawi.
11. Siquijor.
12. Guimaras.
13. Sulu.
14. Dinagat.
15. Tablas.
16. Marinduque.
17. Calamianes.
18. Basilan.
19. Catanduanes.
20. Bohol.
21. Masbate.
22. Cebu.
23. Negros.
24. Leyte.
25. Mindoro.
26. Panay.
27. Samar.
28. Palawan.
29. Mindanao.
30. Luzon.



CURVE II.

DISTRIBUTION CHART SHOWING RELATIONSHIP BETWEEN NUMBER OF GENERA, WITH SPECIES DISTRIBUTED IN ACCORDANCE WITH STEERE'S LAW, AND THOSE WITH SPECIES DISTRIBUTED IN OPPOSITION TO IT WHEN COMPARED ON THE BASIS OF THE RELATIVE SIZE OF THE SEVERAL ISLANDS.

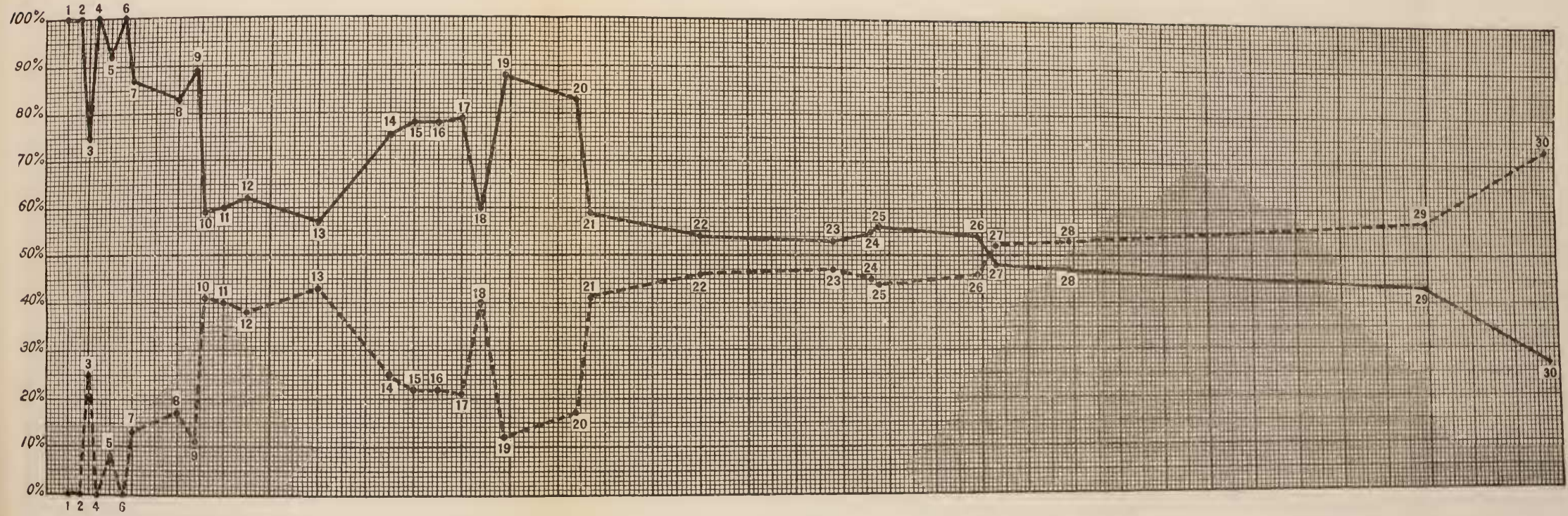
1. Lapac.
2. Fuga.
3. Sibutu.
4. Cagayan Sulu.
5. Romblon.
6. Camiguin.
7. Panaon.
8. Sibuyan.
9. Balabac.
10. Tawi Tawi.
11. Siquijor.
12. Guimaras.
13. Sulu.
14. Dinagat.
15. Tablas.
16. Marinduque.
17. Calamianes.
18. Basilan.
19. Catanduanes.
20. Bohol.
21. Masbate.
22. Cebu.
23. Negros.
24. Leyte.
25. Mindoro.
26. Panay.
27. Samar.
28. Palawan.
29. Mindanao.
30. Luzon.



CURVE III.

DISTRIBUTION CHART SHOWING RELATIONSHIP BETWEEN NUMBER OF GENERA OF NON-MIGRATORY LAND BIRDS KNOWN FROM EACH ISLAND AND PERCENTAGES DISTRIBUTED IN ACCORDANCE WITH, AND IN OPPOSITION TO, STEERE'S LAW. FOUR UNITS OF HORIZONTAL SPACE ARE GIVEN TO EACH GENUS.

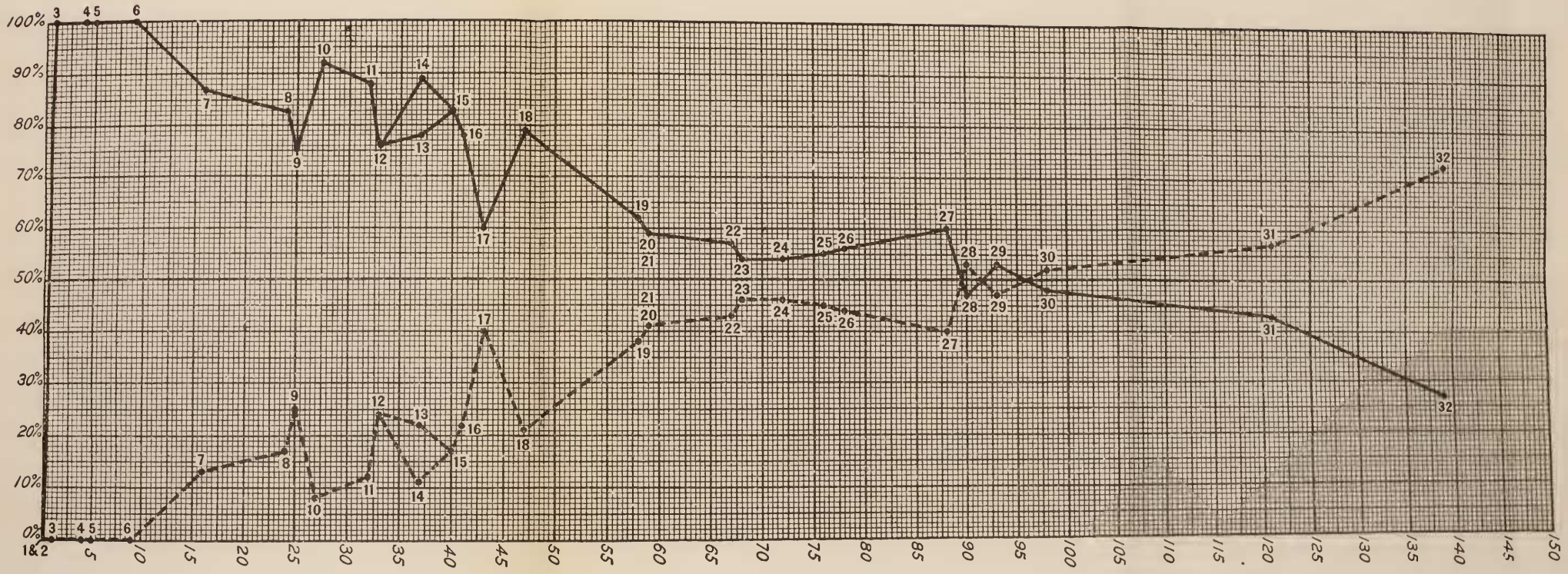
1. Cuyo and Bazol.
2. Sakuijok.
3. Siassi.
4. Fuga and Lapac.
5. Camiguin.
6. Cagayan Sulu.
7. Panaon.
8. Bohol and Sibutu.
9. Catanduanes.
10. Romblon.
11. Dinagat.
12. Marinduque.
13. Siquijor.
14. Balabac.
15. Sibuyan (*a*) and Tablas (*b*).
16. Calamianes.
17. Masbate.
18. Tawi Tawi and Guimaras.
19. Panay.
20. Sulu.
21. Cebu.
22. Leyte.
23. Mindoro.
24. Palawan.
25. Negros.
26. Samar (*a*) and Basilan (*b*).
27. Luzon.
28. Mindanao.



CURVE IV.

DISTRIBUTION CHART SHOWING RELATIONSHIP BETWEEN SPECIES CONFIRMING STEERE'S LAW OF DISTRIBUTION AND THOSE AFFORDING EXCEPTIONS TO IT, WHEN COMPARED ON THE BASIS OF THE RELATIVE SIZE OF THE DIFFERENT ISLANDS.

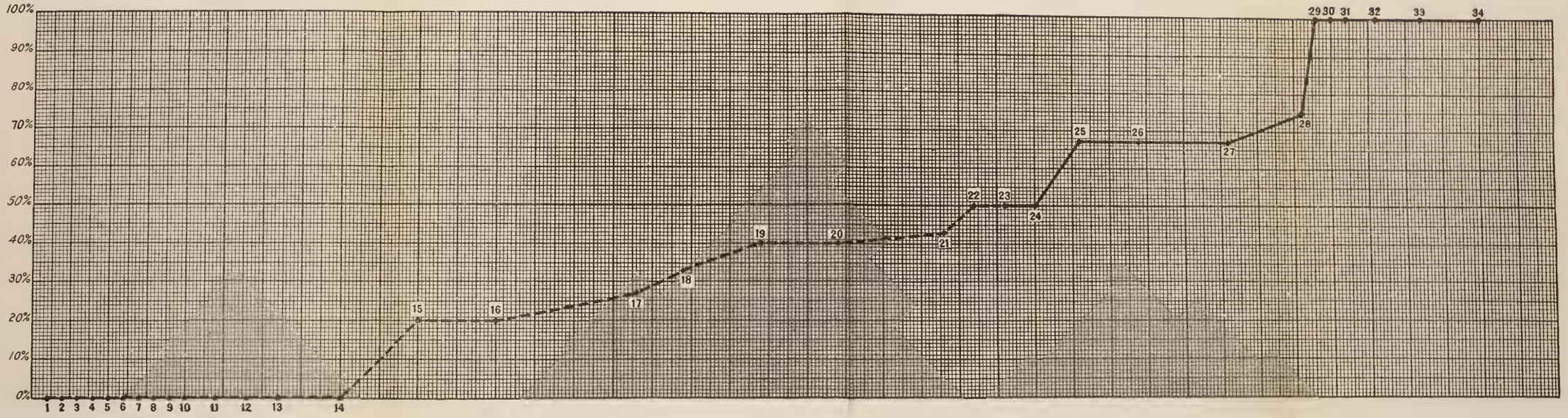
1. Lapac.
2. Fuga.
3. Sibutu.
4. Cagayan Sulu.
5. Romblon.
6. Camiguin.
7. Panaon.
8. Sibuyan.
9. Balabac.
10. Tawi Tawi.
11. Siquijor.
12. Guimaras.
13. Sulu.
14. Dinagat.
15. Tablas.
16. Marinduque.
17. Calamianes.
18. Basilan.
19. Catanduanes.
20. Bohol.
21. Masbate.
22. Cebu.
23. Negros.
24. Leyte.
25. Mindoro.
26. Panay.
27. Samar.
28. Palawan.
29. Mindanao.
30. Luzon.



CURVE V.

DISTRIBUTION CHART SHOWING RELATIONSHIP BETWEEN PERCENTAGE OF SPECIES DISTRIBUTED IN ACCORDANCE WITH, AND THOSE DISTRIBUTED IN OPPOSITION TO, STEERE'S LAW, AND NUMBER OF SPECIES OF NON-MIGRATORY LAND BIRDS KNOWN FROM EACH ISLAND. TWO UNITS OF HORIZONTAL SPACE ARE GIVEN TO EACH SPECIES.

1. Bazol.
2. Cuyo.
3. Sakuijok.
4. Camiguin.
5. Fuga and Lapac.
6. Cagayan Sulu.
7. Panaon.
8. Bohol.
9. Sibutu.
10. Romblon.
11. Catanduanes.
12. Dinagat.
13. Marinduque.
14. Balabac.
15. Sibuyan.
16. Tablas.
17. Siquijor.
18. Calamianes.
19. Guimaras.
20. Masbate.
21. Tawi Tawi.
22. Sulu.
23. Panay.
24. Cebu.
25. Leyte.
26. Mindoro.
27. Basilan.
28. Palawan.
29. Negros.
30. Samar.
31. Mindanao.
32. Luzon.



CURVE VI.

DISTRIBUTION CHART SHOWING PERCENTAGE OF GENERA DISTRIBUTED ACCORDING TO STEERE'S LAW, IN EACH FAMILY OF PHILIPPINE LAND BIRDS. FOUR UNITS OF HORIZONTAL SPACE ARE GIVEN TO EACH GENUS OF A FAMILY.

1. Podargidæ.
2. Meropidæ.
3. Eringillidæ.
4. Hirundinidæ.
5. Oriolidæ.
6. Paridæ.
7. Pittidæ.
8. Ploceidæ.
9. Turnicidæ.
10. Zosteropidæ.
11. Caprimulgidæ.
12. Dicæidæ.
13. Laniidæ.
14. Treronidæ.
15. Sylviidæ.
16. Nectariniidæ.
17. Muscicapidæ.
18. Bubonidæ.
19. Alcedinidæ.
20. Cuculidæ.
21. Falconidæ.
22. Certhiidæ.
23. Peristeridæ.
24. Cypselidæ.
25. Campophagidæ.
26. Timeliidæ.
27. Pycnonotidæ.
28. Psittacidæ.
29. Corvidæ.
30. Eurylæmidæ.
31. Capitonidæ.
32. Dicruridæ.
33. Bucerotidæ.
34. Picidæ.